Vol. 10 MAY, 1928 No. 2

THE PAPER INDUSTRY

REG. U. S. PAT. OFF.

The Monthly Educational Journal of the Paper Industry

For Instance—

The main drive of the Emerson Carey Fibre Products Co.

A main drive belt must be good. If it stops, everything stops, if it wastes power, every drive in the plant is cheated of power it should be getting. That's why big companies are mighty careful when they buy a main drive belt—and that's why we're mighty proud that the Emerson Carey Fibre Products Company came to us when they wanted a new belt for their main drive, seven years ago.

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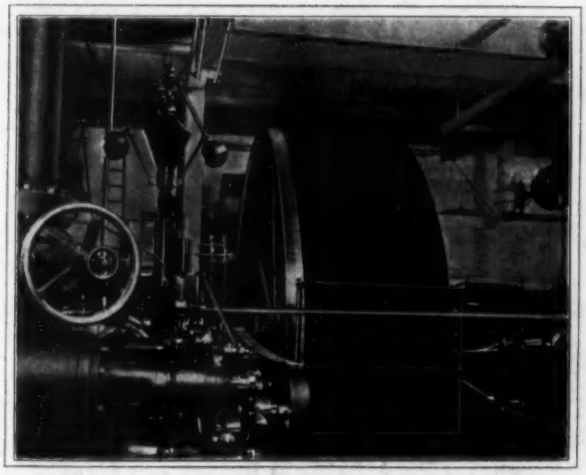

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The Coe prevents blistering, uneven drying or warping. Temperature, humidity, speed—all are under the operator's control.

Let us show you some of the operating advantages of the Coe Model 23 Roller Dryer. Bulletin 104-I will be sent on request.

The COE MANUFACTURING COMPANY

382 BANK STREET
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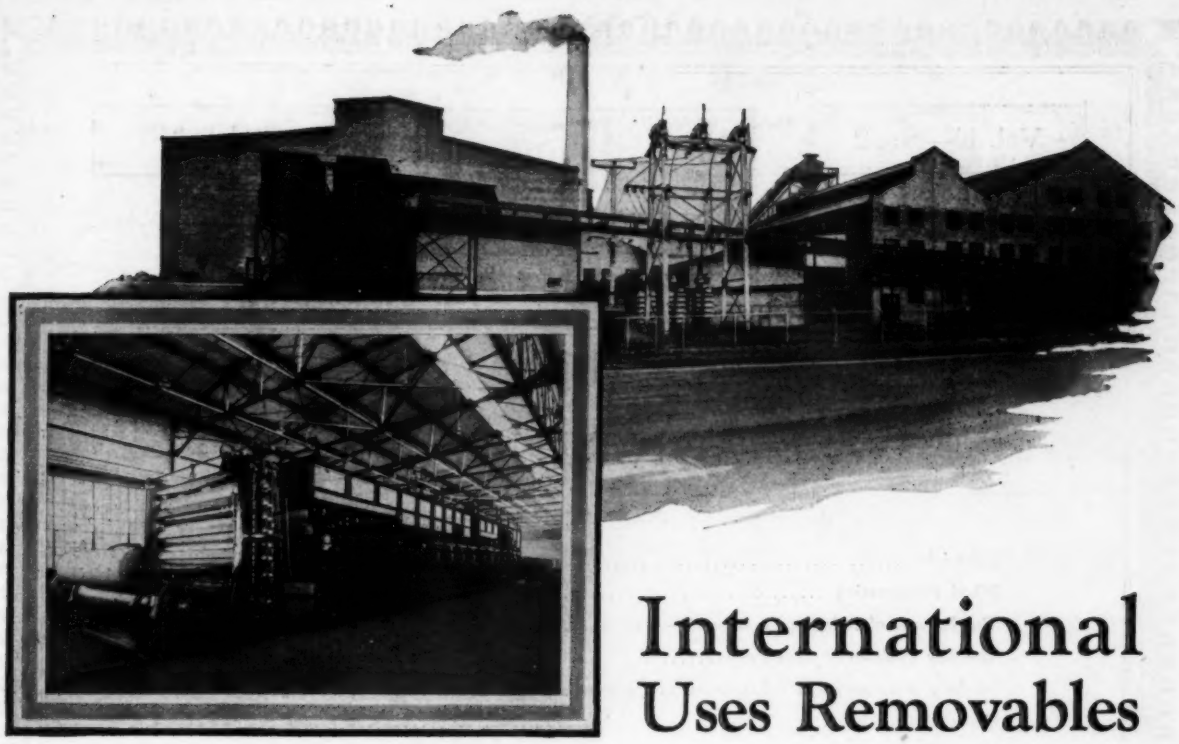
Builders of Dryers for Celotex, Insulite, Sheetrock, Best Wall, Beaver Board, and Many Other Nationally Advertised Boards.



International Uses Removables

TWO Beloit Removable Fourdriniers with Aldrich High-Speed Shake have just been installed in the International Paper Company's new kraft mill at Camden, Ark. The illustration above shows the International's Louisiana mill at Bastrop, La., in which two 162-inch Beloit High-Speed kraft machines are used.

The fourdrinier part of each of these machines incorporates the following three Beloit features essential to modern requirements:

1. Aldrich High-Speed Shake, adjustable (while running) to length and frequency of stroke, an essential for producing better paper at higher speeds.
2. Adjustable to pitch of wire, by power, while running.
3. Removable by power, as a unit, for changing wires easily and quickly, with minimum of human effort, loss of time and production, avoiding danger of damage to expensive wire and running parts, without disturbing the alignment so vital to smooth performance.

Modern methods demand modern equipment

BELOIT IRON WORKS, BELOIT, WIS., U. S. A.

The BELOIT

BELOIT IRON WORKS PAPER MACH'Y BELOIT WIS.

Vol. 10—No. 2

THE PAPER INDUSTRY

A. SCOTT DOWD
Editor

A MONTHLY EDUCATIONAL JOURNAL
Devoted to the Interests of the Pulp and Paper Industry
THOMAS J. KEENAN, Associate Editor, 18 East 41st Street, New York City

MEMBER AUDIT BUREAU OF CIRCULATIONS

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Make the Paper Industry Prosperous

THE PAPER INDUSTRY is vitally interested in the present and future prosperity of the paper industry—primarily because it is an integral part of the industry.

By the same token, every other corporation, which is an integral part of the industry and functions therein, should likewise be vitally interested in the sustained prosperity of the industry.

If this were the case, the industry would now be one of the best profit producers in industrial and commercial America. But it is not.

Paper is more essential than steel, automobiles, telephones or telegraphs or any other public utility, all of which divisions of industry are busily engaged in producing profit and prosperity for their enlarging army of investors.

The consumption of paper and wood pulp products is expanding at an unparalleled rate. The consumption of paper alone rose from six million tons in 1921 to over ten million tons in 1926—an average yearly gain of 800,000 tons. During that period of unprecedented increase, some of the largest corporate paper concerns lost millions of dollars.

What's the matter?

Brainless management. The men directing the operation of large dominating paper, pulp and board tonnages have been obsessed with the idea that the volume of sales irrespective of price or profit was the high road to success, and that increasing the capacity to produce, irrespective of the market capacity to absorb, was the one sure way to reduce costs.

Such brainless, senseless operating management was foredoomed to bring disaster to the industry and bankruptcy to the companies committed to those policies.

THE PAPER INDUSTRY has protested insistently through these columns against the shameful, criminal wastefulness of such policies—policies which threw great volumes of tonnage upon overloaded markets resulting in the constant decline of prices on all paper products and compelling all producers in all lines of the same industry to operate at no profit, and in a great many cases, at less than cost. It is the dog in the manger policy—the cruel, criminal, brutal forcing of a wonderful industry into bankrupt operation.

Yes, it is true that some of the "deficit boys" have been separated from their positions as operating directors and have handed on to their successors, in one case at least, a twenty-million dollar a year volume of business which lost an average of a million dollars each year for the past five years.

"We point with pride to the big business which we develop," says the swan song of the "deficit boys,"—where on the contrary, THE PAPER INDUSTRY points with shame to the huge surplus lost and the profits dissipated during that run of brainless management.

In spite of this outstanding example of poor management and bad policies, over-production and vicious competition engendered thereby, we still have imitators continuing the same line of faulty defunct management as instanced above.

It is high time that all deficit operations of pulp, paper and board mills in this glorious industry of ours should cease. Men who cannot run mills at a profit must get out and give place to men who can and will operate at a prosperous

EDITORIAL

profit. The Industry is entitled to a profit. The Industry can become prosperous. It shall take its place beside its sister industries which are creating wealth for American investors. The paper industry cannot expect to win its race for its desired place along side the profit producing industries in this country, hobbled by brainless management.

American investors demand profitable returns on their investment. The paper industry offers a magnificent opportunity for such investments, but the paper industry must have men of brains, integrity, ability, honor and good, sane management to win. A deficit creating industry has no place in American commerce.

THE PAPER INDUSTRY puts this problem of abolition of creating deficits squarely up to the directors and stockholders of the great paper corporations of the country.

Profitless Prosperity

THE question of whether there is a real profit to our supposed-to-be prosperity or not, depends upon many things. We have been talking about waste of various kinds under the above caption, and this subject has many angles to it.

This publication has had much to say on the subject of safety. Unsafe methods in pulp and paper mills are wasteful methods, as well as profitless methods. If unsafe practices are countenanced in a mill, and if someone loses a finger or a leg, or his life, this is a waste. Most of the material that has been published on the subject of safety has been along the lines to educate the workmen in the mills to safe practices. We are wondering if it might not be well for the men higher up in the mills to consider the question of safety from their standpoint. The management must also be educated as to what are safe practices, as well as the men down in the mills.

Some days ago a workman was trucking waste paper in a board mill to a big breaker beater, and backed into the vat. Before anything could be done, his body had gone under the big beater roll, and several days later there was a funeral. Someone will have to pay for this accident. Possibly some wife is deprived of the protection of her husband, and likely some little kids are mourning the loss of a father. It does seem ridiculous that the management of any mill would continue to allow such a dangerous place in their mills with men working close around it, and it does seem that a machinery manufacturer should not sell a machine so dangerous to be around without furnishing proper safeguards or insisting that the mills do so.

This type of machine is a big concrete tank and in this instance, the opening or vat top is level with the floor. If anyone should drop into one of them, as this man did, he would be drowned even though his body did not go under the roll. To the plant this means hurting the morale, as well as higher insurance, aside from the loss of time from all of the employees standing around talking about the accident, and with a large number of the employees going to the funeral. This means a considerable loss, and is another form of waste.

We are reminded of a case where the cooker in a sulphite mill told the superintendent that he would not use a certain digester because the blow-off pipe was not safe. The superintendent told him to go ahead and fill the digester and cook it, and that he would personally take care of it when it was necessary to blow it off. At the proper time the superintendent went to the basement, opened the line, stood there for a few minutes to see how it would work, and he was buried two days later. In this case, the superintendent wanted the cooker to do this work when the cooker knew that the line was unsafe. The sensible thing to have done would have been for them to have repaired the pipe line before the digester was used.

A workman was found dead in a chip bin in a sulphite mill not very long ago, and it was stated that the man had possibly fallen asleep after he had been told to go into the chip bin and handle the chips. It does not seem possible that a man would go to sleep in a place like that, because he would know of the danger. The chances are he fell into the bin and was covered with the chips and overcome. If proper precautions had been taken, and everything put in first class shape, the chances are this man would still be living.

This recalls another case where a young man was sent into the chip bin without any means of getting out until the work was done. The fumes from the digester went up through the chip bin, and this young man was nearly suffocated. By extreme exertion he finally released himself from the chip bin, and has been a useful citizen since. If the fumes had been a little stronger he would have been overcome, and someone probably would have accused him of lying down and going to sleep. A life belt should be used in such cases —and we believe that some states demand this by law; the Safety Code sponsored by the National Safety Council and approved by the American Engineering Standards Committee, provides it, but most mills do not use them.

Such practices are not profitable. Every time someone loses a life it means a cost to some firm. It destroys the morale in the mill, and is costly from many other angles.

Every now and then these things come to us, and many of them point to the fact that the management in many mills are not sufficiently careful. The man higher up should not send any man to do a dangerous job without every precaution being taken to prevent an accident. Nor should he send a man to a job that he would not want to do himself if positions were reversed.

Safety First means safety must come first for everyone, and if safety methods are used for everyone it means cutting down considerable waste, which means expense, and if these wastes

$305,476 added to NET PROFITS of eight companies

Of this group, the smallest saving realized amounted to $6,815. The greatest individual saving was $71,950. The average saving of this group of eight corporations, through economies effected, equaled $38,184.50 each.

These are typical of the results that many concerns have received through our cooperation. Unencumbered by any fixed plan or system to be installed, we are able to increase profits through open minded analysis of any business, and the application of simple corrective measures.

"Making a Profit"

—a booklet—explains the soundness of our methods in attacking such problems as you probably face. Copies will be gladly sent on request.

L. V. ESTES INCORPORATED

INDUSTRIAL ENGINEERS

4753 Broadway
CHICAGO, ILLINOIS

EDITORIAL

and expenses are cut out, this is another means of eliminating the profitless part of our prosperity.

One large paper making company advises that the accidents in their plant cost fifty cents for every ton of paper made. Most any executive could profitably employ his time by figuring out how many dollars per ton of product it costs his plant for accidents and all other classes of waste, provided he would be willing to see the hazards and wastes around the plant. If the plant is not showing a profit, why not try cutting out the waste? Or if a profit is made, why not make it larger, and help to make a real profitable prosperity for the company?

Suction Roll Litigation

THE decision handed down by Judge Oliver B. Dickinson, of the U. S. District Court at Philadelphia, in the case of the Paper and Textile Machinery Company, of Sandusky, Ohio, vs. the Downingtown Manufacturing Company, of Downingtown, Pa., has features of interest not wholly related to the question at issue, which was to determine whether the patent covering the Millspaugh suction roll had been infringed by the manufacturers of the Kilberry suction roll. The bare facts of the decision are that when operated with a Nash pump the Kilberry suction roll constitutes no infringement of the patent protecting the Millspaugh roll but that when used with a Roots-type twelve-rotary vacuum pump it does conflict with the Millspaugh patent.

The decision reached was influenced apparently by the knowledge obtained during the course of the trial that the Nash pump was not known to those skilled in the art of papermaking by the name or designation of "a positive rotary pump." In two installations of the Kilberry roll made by the Downingtown Manufacturing Company, one of them—the one at the St. Regis paper mill, in which a positive rotary pump of the Roots type was used, was held to be an infringement of the Millspaugh patent, while the other installation at the mills of the Jessup & Moore Company at Wilmington, Del., in which a Nash pump was used, was declared not to conflict with the Millspaugh patent for the reason that a Nash pump was not a positive rotary pump as understood by the trade.

It is to be regretted that the decision is unsatisfactory to both parties to the suit, each of which has taken an appeal from that part of the judge's decision which bears on the validity or non validity of the patent in respect to the use of certain pumps. The Paper and Textile Machinery Company takes an appeal from that part of the decree which holds that the Nash pump installations do not infringe and the Downingtown Manufacturing Company appeals from that part of the decree which holds the Millspaugh patent to be valid even when confined to the positive rotary pump.

It is evident that Judge Dickinson in his study of the case has delved deeply into the history of papermaking, for in his decision he makes several interesting references to the antiquity and present-day importance of the art and craft of papermaking and he pays a special tribute to the conduct of the trial by counsel and experts, which he said was in keeping with the dignity and importance of the subject. "Knowledge has been lavish of 'her ample store' and all the resources of science and experience have been placed at the service of the Court. We would not wish to be thought unappreciative of the richness of the offerings made or would we like to feel that all this enlightening labor had been wholly wasted. As we view it, however, the decision of the cause turns upon two doctrines of the law or rather which of them is applicable." The learned judge then goes on to review the history of the litigation and takes occasion in the course of this to define the meaning of a patented invention. He gives a very thoughtful and illuminating exposition of the subject, describing with a wealth of detail the formation of a sheet of paper from the thin suspension of pulp as it passes over the fourdrinier wire to the press rolls. He even adds a comment on the pronunciation of the word "couch" in couch roll, on which there seemed to be a lack of accord on the part of witnesses at the trial.

Neither does it seem were the litigants of their witnesses in accord as concerns the exact place on the paper machine where the product becomes paper, but the court assumed that paper is formed as the stuff passes over the couch roll, or as the judge himself says, "We will assume that the name paper may be used at the stage at which the Millspaugh roll comes into use. We say this because this is at the old Couch Roll stage at which the product is by an ingenious method transferred from the wire conveyor to what we will call a felt or wet felt conveyor. The product at this point must have a degree of strength sufficient to enable it unsupported to pass from one conveyor to the other, there being an open space between them."

In the Court decree, considerable emphasis is placed on the function of the pump employed in operating the Millspaugh suction roll and there is even an intimation in the decision that the only novelty in the Millspaugh invention was the use of a more effective pump than was employed at a time prior to the introduction of the Millspaugh roll. Where a suction roll of the Millspaugh type is operated with a pump that is commonly known to be of the positive rotary type, it is held to be an infringement of the Millspaugh patent, but any other kind of a pump capable of creating a sufficiently high vacuum for the purpose designed may be used with a couch roll without infringing the patent. To quote the text of the decision, "any one is in consquence permitted to use with a Couch Roll any combination of any things, except that one of them may not be a pump known to those skilled in the art by the name or designation of a 'positive rotary pump.'"

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Vol. 10 MAY, 1928 No. 2

Wood Preservation

Past Experience and Present Day Methods of Chemical Treatment of Wood with Preservatives---the Relation of Wood Preserving Treatment to the Pulp and Paper Industry

By JOHN G. KREER

Vice-President and Technician of American Wood Impregnation Corporation

THE more interesting phase of the history of wood preservation is found, not in a listing of the long series of materials that have been tried and the methods of application that have been employed, but in a consideration of the attitude of the consumers of forest products to the idea of treating them so as to insure permanence.

The oldest form of the art is recorded from prehistoric times by the charred surfaces of construction timber used by the Lake Dwellers in what is now Switzerland. Striking evidence of the preservative effect of a charring of the surface is found in some of the partly burned structures of these people that have survived all the intervening ages. There were conflagrations, started perhaps by lightning, perhaps by human carelessness, that chanced in some way to be quenched before complete destruction had occurred, and portions of the structure were left with charred surfaces.

Thus protected, we have found the most complete record of this race of men kept intact through uncounted years; portions of their dwellings, altars, docks, and bits of clothing, fishnets, wooden utensils and even foodstuffs maintained for generations after all uncharred items had been disintegrated.

What a tedious lapse of time must have passed before these primitive, slow-thinking folk had gained from observation of the effects of accidental charring of timber the knowledge that inspired them to deliberately apply such a method of wood preservation to their construction work!

They had no methods of testing, no experimental stations, no Forest Products Laboratory to carry on accelerated trials, no chemical research institutions; yet in the adoption of preservative treatment, suggested to them in a crude way by natural events, for the exposed members of their structures, they put to shame some of us quick-witted moderns, who in spite of the accumulated proofs of history, and fully detailed instructions for procedure, and ample facilities offered us for protection of exposed timbers, still go on aimlessly dilly-dallying with untreated timber that is uneconomic, short-lived and utterly wasteful when installed in places where it is subjected to the risk of decay.

Cause and Process of Decay

Our forefathers considered the rotting of wood an inherent characteristic, and as late as 1840 Liebig suggested an external infection only as a contributing cause that started the process of decay.

It was not until the year 1900 that the work done by Hartig and Tubeuf in Germany secured practical recognition of the true nature of the mechanism of this destruction of timber and started the present-day scientific consideration of the problem of prevention.

Now the microscope has revealed to us the infecting spores of the fungus growth that, living deep down in the interior, feeds upon the cellulose and lignin of which wood is mainly composed, secreting fluids that break down and dissolve the complicated hydrocarbon matter the tree had built up, and leaving a soft, shrunken, crumbling mass that can not serve further to carry any load or stand up under any stress.

The threadlike strands of this interior growth, called mycelium, can hardly be detected until a section of the wood is stained with coloring matter which, being differently absorbed by wood fibre and fungus strands, renders the latter more distinctly visible. Thus long before there is any external sign and even when the interior exposed shows nothing noticeable to the untrained eye, most of the strength of a piece of timber may have been sapped by these insidious destroyers.

Often it is only after the feeding ground inside has been completely occupied that the final stage of development, the outside growth, the hymenum or wedding-bed occurs. Then the application of curative measures is too late to serve any purpose. There is no way to rebuild the strength of rotted timber and prevention is our only objective.

The hymenum of a fungus growth produces and ejects myriads of spores, microscopically tiny seeds, that air curents carry away and spread in every direction to seek new feeding grounds in other timbers. Nature is prodigal for the lower forms of life in the means of propagation and a single fruiting body has been estimated, from the count of a small portion of its surface, to release several hundred million such spores. One rotting log may be the source of more embryonic fungi than a whole generation of human babies.

The spore, like the seed of any other form of vegetable growth, when buried in suitable ground where its food supply is at hand, such as a weather check in a timber or the crevice between two of them, and when there is a sufficient supply of moisture and proper temperature, will germinate and in a very short time, under favorable conditions, there will be a vigorous flourishing spread of fungus, hidden away from our observation, consuming the very structure of the timber while the untouched surface shows no mark.

Through the long period from the start of wood preservation to comparatively recent times, progress in preventive methods was slow in the absence of any exact knowledge of the real nature of the attack which men sought to forestall.

Early Steps in Preservative Methods

Apart from charring, curing with smoke, and surface coating with pitch or resinous oils there were no wood preservative processes employed as such by the ancients nor until well into the nineteenth century.

In 1823, an Englishman named Kyan emphasizing the value of **penetration**, introduced into quite extensive practical use his method of chemical treatment, Kyanizing, which is still employed in a limited way both in the United States and in some European countries.

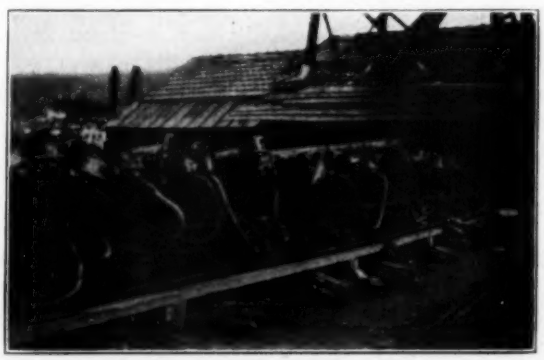
This procedure, a soaking in chloride of mercury (corrosive sublimate) for several days, gave an absorption of ¼" to ⅜", and proved to be a great advance over any mere surface treatment. As evidence accumulated that decay still occurred in the deeper untreated portions of the telegraph poles for which Kyanizing was principally employed, even though the outer shell was preserved from attack, the importance of deep penetration came to be recognized, although methods of economically securing such absorption of treating solutions as to reach all the interior of the poles were not known.

Boucherie plant still in use in Switzerland in 1926 for treating telegraph poles with copper sulphate

In France, Boucherie about 1837 applied treating solution to one uptilted end of freshly felled unbarked logs under a pressure of one or two atmospheres. The pressure is established by feeding the solution from a storage tank on a tower raised above the level of the rows of logs.

Only freshly cut logs in which the sap is still liquid enough to flow freely can be so treated. There are a few such plants still in operation in Europe, and in a very small way this sap-replacement is applied in this country to logs for staining the wood to be used in furniture manufacture.

About 1840, the Bethel process of full cell impregnation was patented in England; closing the material

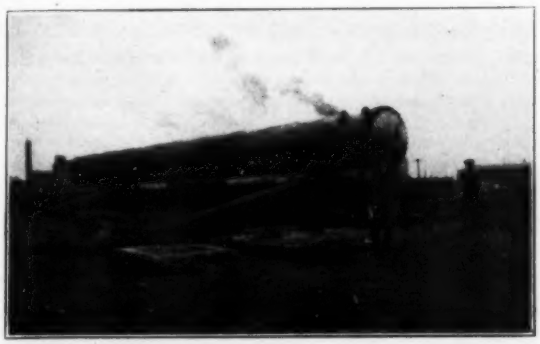


Wood blocks clamped to end of poles with hose connections supplying the treating solution

to be treated within strong cylindrical steel retorts, where vacuum followed by submergence under the treating solution and then long continued high pressure, secured a really effective absorption, sufficient to reach all the sapwood with zinc chloride in as concentrated a solution as can safely be applied

without fear of chemical injury to the wood fiber.

Creosote—the dead oil coming from distillation of coal tar, and containing in solution a variety of toxic ingredients, tar oils, phenols, creosols, and other organic hydrocarbons, which had long been used for surface coating and dipping—when applied by full



Unloading a modern pressure cylinder for a Wolmanizing plant. Such treating cylinders are 6 to 8 feet dia., 85 to 150 feet long, for pressures up to 250 lbs. per square inch

cell vacuum and pressure treatment, proved to be the most effective of any of the preservative solutions of that period.

As by-product coke ovens came into use, turning out large quantities of coal tar from which what was for many years a plentiful supply of creosote at a low price was available, this material for the time being almost displaced all others in treatment of railroad ties, piling and other applications in which the discoloration and clinging odor imparted to the wood were not objectionable.

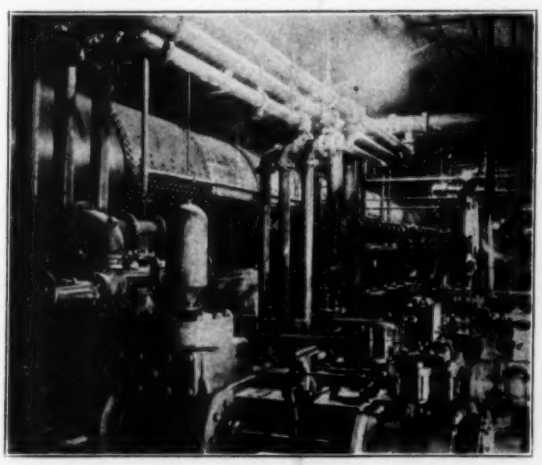
Besides straight creosote and zinc chloride, mixtures of the two, either in two-movement impregnation or with the Card Process Emulsion injected in one operation were used. Patents were applied for by the hundreds during the succeeding fifty years, sort of cheap by-product of the chemical industry, covering every sort of cheap by-product of the chemical industry, and many of them were tried out at great expense only to be found wanting. The many failures of these arbitrarily assumed nostrums had a serious effect on the spread of wood preservation, the more so because at the same time many consumers, attracted by the growing success of real preservative treatment but anxious to try it in some cheap way, resorted to surface treatments with the mistaken idea that they were experimenting with wood preservation.

Regardless of the preservative used, the success of the treatment depends upon thorough **penetration** of all treatable portions of the timber that is to be kept sound and free from rot. It is a fact that the true heart of a log resists every effort to force treating solutions into it by any process that has thus far been commercially developed. But practical observation has shown that against most of the forms of decay attack, heart timber is highly resistant if there is absolutely no unprotected sapwood present in which the fungus can gain a vigorous start. Then too, for most of the timber which is selected for creosoting, there is enough sapwood which readily takes treatment to present an outer surrounding shell thicker than the normal checks are likely to reach, so that results have been most satisfactory without having to impregnate the heart.

Development in Penetration Process

As experience established more and more clearly that the cause of failures was to be found in imperfect penetration, pressures were increased and methods worked out to force solutions deeper into timber. This, however, involved increasing expenditures for preservative, at the same time that the cost of creosote began to advance. The installation of new coke-ovens was no longer keeping pace with expanding demand for wood preservation on the part of the railroads. German chemists were dipping into the tar-pot for increasing quantities of material for the preparation of dyestuffs and the new phenol precipitate products such as bakelite, and it became evident that the price of creosote must materially advance. With waterborne solutions, the concentration of the toxic material could be readily adjusted to provide for greater absorptions and still leave only the desired amount of net preservative retention; but there was not at that time any acceptable dilutant of creosote recognized.

This difficulty was met by Rueping in Germany in 1902 and at about the same time by Lowry in Amer-



Pump room, filler head and retort of a modern Rueping process creosoting plant

ica, with the introduction of what is known as the empty cell process, which constituted the final important step in creosote treatment. Rueping treatment is based on the theory that with methods of impregnation to secure sufficiently deep and thorough penetration, there is a large excess of preser-

vative injected, and occupying the cavities of the wood cells, which serves no useful purpose but evaporates from the wood without contributing to its longevity. Rueping claimed that ample protection is secured by the amount of creosote that is absorbed in the cell walls, and that recovery of the excess from the cavities would be clear saving. By first pumping air under pressure into these cavities, submerging under preservative held at the same pressure, and after submergence impregnating with still higher pressure until nearly the double quantity desired has been injected, a very deep penetration is secured. When this high pressure is released, the expansion of the entrained air within the wood serves to push out most of the free creosote that has not been absorbed in the cell walls. Thus 12 to 14 pounds of creosote may be first injected per cubic foot of wood, which is then reduced by the kick-back of the empty cell process to 8 pounds per cubic foot.

The economic value of preservative treatment has been conclusively demonstrated for railroad ties, even though ties have perhaps the lowest manufacturing cost per thousand feet of lumber, a very low rate of installation cost, and comparatively little incidental replacement expense compared to other forms in which lumber is used. About 60,000,000 treated ties are placed in track in the United States yearly, but it is estimated that the earlier use of such ties is already saving the railroads from replacements of more than fifty million ties a year. The complete success of wood preservation in this field is attracting more and more the attention of other users of lumber. Yet ties, poles, piling and

Typical roof construction of Wolmanized lumber used in many textile and paper mills

bridge-timber, according to the latest published statistics comprised something like 90 per cent of all the preservative treated material used in the United States. Only 9 or 10 per cent of the lumber produced is given this protection, while many times that amount needs it, and would result in even greater actual economies than in the case of the rough and but slightly manufactured items that the railroads have impregnated.

Next to the railroads, European mines, particularly those in Germany, have made the greatest advance. In most mines, at least a portion of the timbering is exposed to extraordinary severe decay attack, hardly equalled elsewhere unless, perhaps in some of the textile and paper mills where the warm

Complete equipment of a modern small Wolmanizing plant

moisture-laden state of the air creates ideal conditions for fungus growth in floor boards and roof planks.

A Clean and Odorless Treated Lumber

For the mines as well as for mill construction work, an effective preservative that would produce clean, odorless, treated lumber is desired and one that will possess some degree of fire retardation. For mill construction, it is also essential that the lumber can be painted with assurance that there will be no bad effect on the painted surfaces from the presence of the preservative in the lumber.

To meet these needs, a very active period of research and experiment occurred between 1904 and 1913. European chemists and wood preservers took the lead in this movement, and out of years of investigation and trials they produced the fluoride-phenol mixtures in water soluble form, the best known of which are the Wolman Salts, Triolith and Tanalith. These are now well established in Germany and some other European countries, and the use of them is spreading rapidly all over the rest of the world. Both in the United States and in tropical Central America they are extensively used.

Early in this period, Dr. Richard Falck in Muenden, in collaboration with Dr. Wolman and the Ruetgers Works of Berlin, devised means of accurately determining in the laboratory in a short time (3 or 4 months) the toxicity of materials by means of small blocks of wood impregnated with the preservative under investigation. Reliable establish-

ment, under approximate service conditions of, comparative toxic value, the principal factor in regard to any preservative, furnished a sound basis for investigations along scientific and technical lines.

In this period, too, the U. S. Forest Products Laboratory was established at Madison, Wisconsin, and in spite of rather meager equipment and none too liberal appropriations from Washington, has contributed an astounding amount of valuable information to the art of wood preserving by its research, investigations and compilation of data.

The war period both here and abroad shows little advance. This was probably due to the fact that men's minds were preoccupied with things that would produce immediate present results, while the benefits of wood preservation extended a few years into the future. Our problems remained, however, and since 1923 there has been renewed activity, both in the widening demand for and application of wood preservation, and in research work, and a new crop of patented preservatives has appeared.

Even with modern laboratory facilities, however, and with all the new information we have, there remain elements that demand the test of time before final judgment can be passed upon these newer suggestions that are now being tried.

There are now available in commercial form, tried and proven preservatives and methods of treating to meet any service conditions, not only in railroad work and mining, but in the general construction field as well, no matter how exacting the requirements to supply timbers and lumber free from any objectionable characteristics, dependable elements of permanent construction, and obtainable at prices that make their use of unquestionable economic importance.

The Process of Sulphite Manufacture

Part II—Acid Making

By FRED MOTSCHMAN

Member of T. A. P. P. I. and Sulphite Chemical Engineer

This article is the second of a series by Mr. Motschman which will appear from month to month in The Paper Industry, constituting what might be called a practical course on the sulphite process.

THE liquids used in cooking of wood by the sulphite process vary considerably in composition, but in general they are solutions of sulphur dioxide gas in water containing, either in suspension or solution, some base such as lime, soda, magnesia, or ammonia. The process is one of sulphonation of the non-cellulose material, combining it with the sulphur and the base of the acid as a soluble compound and then separating the soluble from the insoluble by draining and washing in the pits. For this reason, it does not matter so much just which metal we use for the base, but rather the base will depend more on the cost as compared with quality of product than any other one factor. Lime is chiefly used because it is cheap and this is especially so when a mill is so hooked up as to be able to use a reclaimed lime. The outstanding advantage of the bases sodium, magnesium, and ammonium is the soluble form of their sulphite salts. This is not true of the lime base. The **bisulphite of lime** with which we cook **is only soluble in the presence of an excess of SO_2**, and when the free SO_2 is lowered, as in the case of too rapid a temperature rise in the early part of the cooking, we get a precipitation on the fibers of a very insoluble compound ($Ca\ SO_3$) which gives a hard screening, hard bleaching stock.

From the history of the sulphite process, we can learn a very valuable lesson. About the time of the Civil War, the early workers on sulphite began to take out patents. They started to cook wood with a solution of SO_2 but on cooking with the sulphurous acid ($H_2\ SO_3$) they found that invariably their pulp became darkened and that the liquors showed a very high acidity from sulphuric acid ($H_2\ SO_4$). To offset this acidity they naturally turned to lime as a cheap neutralizing re-agent. Immediately they began to make lighter colored pulp but the lime was not in the waste liquor as a simple salt of the sulphuric acid ($Ca\ SO_4$); it had actually taken an active part in the sulphonation of the lignin and was in the waste liquor as a calcium salt of the ligno-sulphonic acid. We call the compound calcium-ligno-sulphonate.

More recent experiments have proven that the base of the acid follows the Free SO_2 into the wood before the cooking starts in the digesters. Thus while the lime is held in solution, in the acid making, by the excess of Free SO_2, the latter is very important in the proper penetration of the wood.

Principles of Acid Making

There are numerous makes of acid systems on the market, each with claims of distinct advantages to be derived from the use of its own equipment. To the acid maker, **their names** should not mean so much as **their types.** To my mind, the right kind of an acid maker should be able to run any sort of a system if he has the piping details of the new system carefully in mind. He will be able to make acid with the new system if he has first mastered his old sys-

tem and then applies his knowledge of the basic principles of acid making to the new flow sheet. Regardless of the type of system by which the acid is to be made the following principles should be thoroughly appreciated by the operator:

1—When sulphur burns, it is a direct union of sulphur with the oxygen of the air. $S+O_2=SO_2$.

2—In order to burn one pound of sulphur, there will be required enough air to furnish one pound of oxygen.

3—One pound of oxygen is the amount contained (at room temperature) in 11.75 cubic feet of air.

4—The rate of sulphur being fed to the burner being constant, any excess amount of air, over the cubic feet necessary for complete combustion, will mean a proportionately lower strength gas produced.

5—When burner gas is dissolved in water or in lime water, the extent to which it will be held in solution will depend first of all on the temperature of the resulting solution. The colder the solution, the stronger it can be made. Therefore, the gas should be cooled as low as is possible with the amount of water available and the area of cooling surface in the gas coolers.

6—The rate of air into the burners being constant, or the damper front wide open, any excessive sulphur feeding will result in sulphur vapor being carried over with the gas. If there is air leaking into the combustion chamber, this free sulphur may be here burned to SO_2, but if carried on in this way the inevitable result will be coolers plugged with sulphur which drops out in cooling.

7—The solubility of SO_2 decreases with an increase in temperature, **provided** that the pressure on the system remains constant.

8—The temperature being constant, the solubility of SO_2 increases with an increase in pressure.

9—In the case of lime as a base, the solubility of the bisulphite decreases with an increase in temperature. This point should be very thoroughly appreciated as it will explain why lines, entrances to towers and tanks, will sometimes "lime up" even when strong relief gas is encountered which should "cut" any lime still in suspension but instead causes more to come out of solution.

10—In normal operation of the acid system, there will be found a temperature rise of from 8° to 18° when the lime water reacts with the SO_2. This heat can be offset by cooling but cannot be avoided as it is the natural "heat of reaction" or the chemical heat arising from the formation of $CaSO_3+Ca\ (HSO_3)\ 2$.

Sulphur Burning

As sulphur comes to the sulphite mill it will be either in the form of a yellow powder whose density is just about twice that of water or else in the form of an ore called iron pyrites or "Fool's Gold." This latter is an older form and not so common in mills today. It is an iron sulphur ore which contains enough sulphur to support its own combustion when fired in furnaces and sliced frequently to give the air access to the sulphur.

Nearly every mill has now changed over to burning molten sulphur in the rotary type of furnace. The rotary furnace consists of a heavy steel cylinder about 12 to 15 feet long and having short truncated cones fastened to either end, thus forming the inlet and outlet ends. The outlet end is tapered down to fit the flange of the cast iron gas piping (15″). The small end of the cone at the inlet end will be about the same diameter as the opposite end, but it is fitted with a pair of flanges with grate openings around the outer edge, and through their centers is an opening for an 1″ or 1½″ pipe through which the molten sulphur enters. By rotating these flanges past each other, the grate openings may be adjusted to suit the firing conditions. Contact between the molten sulphur and the air in which it is being burned is absolutely essential to complete and rapid burning. Impurities in the sulphur will rise to the surface and cause a floating scum to form there which breaks the contact between the sulphur and the air. The rotary burner overcomes this difficulty by rolling the charge and thus continuously breaking up the scum and exposing a fresh surface. The level of molten sulphur is held by means of a hand regulated plug-cock, at a point just below the bottom edges of the end flanges of the burner. At either end of the cylindrical section of the burner are shrunk on steel tires which run on pairs of small trucks which are driven, through gear and pinion or chain and sprockets, at a low rate of speed. The burner is thus rotated about its horizontal axis, and as the charge is rolled, the surface is kept broken and fresh. Also, some of the liquid clings to the side walls where it continues to burn until submerged on the other side. The acid maker knows what a difference it makes in the amount of sulphur which he can burn on his shift whether the driving mechanism is in working order or not. With the burner rolling, the fires are burning in a complete arc, whereas with the drive down the sulphur is burning over only 2/5 of the same surface.

Preferably, the sulphur should be melted before it is fired in the burners. This is not absolutely essential but is a heat economy move. By proper arrangement of the melter pot directly above the burners, much of the steam used in the coils in the melter can be saved. To prove the efficacy of feeding premelted sulphur as compared with the feeding of dry sulphur to the burners, one need only have either a recording SO_2 analyzer or a pyrometer put in to show the conditions of the fires under either arrangement. A glance at the record made when hand firing will show dips in the temperature curves at the times of firing due to cooling of the fires by the heat required in the melting of the fresh sulphur in the burner. In the curve from the gas machine,

there will be found dips in the line (poor gas) just before and during the firing, because the charge has to be burned down to make room for the fresh dry sulphur, and at this lower level the ratio of air to SO_2 becomes higher in favor of the air. In the firing of molten sulphur, reasonably close supervision on the part of the operator to hold the level in the burners uniform, will nearly eliminate both of these fluctuations.

The Combustion Chamber

The gases as they leave the burner may contain some free sulphur in the form of vapor which has not had contact with sufficient air. Of course, this condition is not desirable but frequently happens, and so a second-burning or combustion chamber, as it is called, is provided between the burners and the coolers. The above mentioned undesirable condition of sulphur vapor laden gases can be detected when dangerously high by the bluish tinge to the hot gases. This color test is usually sufficient for the experienced operator, but the following handy test may prove the point when the amount of vapor is low:

> Hold a cold glass rod in the stream of gas as is comes from the burner and then take in out into the room. If the gases are carrying sulphur, the latter will be found as small yellow feather-like crystals adhering to the glass. This phenomenon of the appearance of crystals of sulphur on cooling the vapor is known as **sublimination**, and the evidence is found as free sulphur lining the cooler pipes.

In the combustion chamber the gases are made to enter this fire-brick lined chamber at the bottom; then, by means of a center wall or partition extending nearly to the ceiling of the chamber, these gases must pass through the space above the partition and then leave the chamber at the bottom nearly opposite the inlet opening. The combustion chamber is provided with air inlets which should be used only when it is necessary to complete the combustion of any unburned S to SO_2. Any air not needed for this purpose and admitted at this point will of course dilute the gas and lower the per cent SO_2 to the absorption system. The temperature of the gases at this point is about 1200° to 1400° Fahr.

Cooling the Burner Gases

There are many different makes of gas coolers on the market and, like the acid making systems, each one claims certain distinctive and desirable features associated with that make. Basically, they are all alike—by one plan or another they all take the hot gases and either directly or indirectly cause them to give up their heat to water cooled surfaces. In all coolers, the flows of gas and water must be arranged to progress counter-current to each other; that is, **the coldest portion of the water (incoming) should be made to meet the most thoroughly cooled portion of the gases (outgoing)** and of course, vice versa.

The **spray tower cooler** illustrates a type of cooler wherein the hot gases come in **direct contact** with the cooler water. The tower is filled with an inert material over which is circulated the cooler water. This inert material will be some sort of an absorbing tower filling, such as broken quartz or, better still, the so called "spiral brick." These spiral bricks are obtainable in different sizes but a 4″ or 6″ size is well suited to this tower. A 6″ brick will be 6″ high by 6″ in diameter. They are a short hollow cylindrical section, the outer face of which is fluted with shallow grooves while the inside is filled with a short helicoid section. When these bricks are placed in the tower they are lined up vertically, and they are all turned so that the short spiral sections line up with each other to form a continuous center passage for the liquors. The liquors also flow down over the outside of the bricks and here the faces of the grooves increase the surface exposed to wetting and for absorption.

The principle of intimate contact between the liquor and gases which must be absorbed in both coolers and absorption systems is of great importance and should be appreciated by the acid maker as well as the designer of the system. Since the gas stream will fill the entire void space, the liquor, with which the gas is to come in contact, should be spread in very thin layers over a large surface. The "spiral brick" was designed with this principle in mind, and for its size, a 6″ brick offers the greatest amount of surface possible in so small a volume.

In the indirect gas coolers the hot gases are drawn through cooled pipes made of acid resistant metal. The flows of the gases and cooler water are arranged so as to have counter-current progress and thus get the best heat exchange. In the high vacuum type of burner gas cooler, the hot gases are at once conducted to the lowest point in the cooler vat and then drawn upward, through the topmost line of pipe which is being cooled by the (coldest) incoming shower water. The water is drawn out of the bottom of the vat by means of the inverted seal at the end of the box. Another important feature gained by this water loop on the outgoing water is that the loop is made of such a height that the water in the vat will not be drawn any lower than the uppermost lines of piping. This gives an assurance that, should the power "kick off" or for some other reason the water supply be shut off, the pipes will not be melted by the hot gases in the absence of any cooling medium.

A special grade of antimony-lead pipe is most generally used for piping in the burner gas coolers. The low percentage of antimony used in the lead makes it harder and also increases its acid resistant properties. In some SO_2 gas coolers, such as those used on digester relief gases, copper can be used. In the case of burner gases, there is always at least a trace of sulphuric acid gas (SO_3) present which would de-

stroy such a metal as copper. Lead does not entirely withstand the action of sulphuric acid, but due to the formation of a thin skin of lead sulphate on the inner surface of the pipes which is insoluble in sulphuric acid, lead gives very satisfactory, long life service. The main disadvantages are the extreme weight per foot of pipe and the fact that lead pipe will not support its own weight unbraced over any considerable span. The rate of exchange of heat through lead is much lower than that for copper. The numerical values for the two metals as to relative thermal conductives are from 8.6 to 12 times greater in favor of the copper.

In the next chapter we will complete our discussion of burner gas coolers and go on to describe some of the details of operation of some of the common types of acid making systems. For this, we will have some diagramatic sketches of these systems to follow, and we will try to explain the chemical and physical principles involved in the various steps.

The Key Position of Man Power

By Herbert D. Allen
Vice-President, Elliott Service Co., New York

This is the fourth of a series of articles which began in the February issue of The Paper Industry. The next subject will be "Developing Mass Psychology in the Paper Mill."

MANAGEMENT is starting to realize that business is today faced with a new labor problem of rather startling magnitude. President Eugene R. Grace of Bethlehem Steel is quoted as saying:

> "We can't cut expenses much farther except by one method and none of us like to think about that. If we have to save invested capital by reducing wages, it will signify that we are really in a serious business cycle. Business is being carried on largely by deferred credits or installment buying. Therefore, if we have to reduce the purchasing power of the working man, it will have serious consequences."

Which is simply a recognition that the American workman is today the major consumer of American manufactures, and that any marked reduction in his buying power will bring in its train consequences harder for management to bear than for labor.

But there is a more encouraging aspect to the picture. Managment—efficient management—learned how to make high wages profitable. As Secretary of Labor Davis says, "The low wage countries of the world are not the prosperous countries. The low wage industries and sections of the United States are not the most prosperous ones."

Now management is neither bankrupt of ambition nor resource. In talking to many of the leading industrial managers in the last few months, there was evident a real confidence that American business could control a situation it had created.

Edward A. Filene, the Boston merchant who has watched as a buyer for many years the vicissitudes of New England industry, contrasted the two schools of management in a recent speech before the Brooklyn Chamber of Commerce:

> "Just lately the papers told us as a matter of course, that cerain cotton mills had met the slump in their industry by making a flat ten per cent cut in wages.
>
> "A few days later another news note said that another group of cotton mills would start up at the old wage scale. They had worked out plans for reducing costs by re-arranging machinery, and by adopting better manufacturing methods of many sorts. Their costs were as low as those of their wage cutting competitors. The buying power of their workers was unimpaired.
>
> "What is more their reduction in costs is permanent, while the reduction secured by their competitors will continue only until the workers can successfully demand that the old wage scale be reinstated."

Business has swung ahead into its present commanding position of prosperity by making its improvements permanent. But there is room for tremendous improvement in the industrial relations side of the picture in its relation to low cost production.

It has often seemed to us that the reason management sometimes seems to pay such relatively small attention to the human side of the production is twofold. First, the problem being human, is complex and seems intangible. Second, management takes the worker for granted, has never really gotten over the idea that "there are lots more at the gate," and has never put down on paper or really studied the place of man-power as a general factor in production.

The Business Development

What follows is an attempt briefly to review the business story up to this point, and to chart out the position and relative importance of man-power in production. The purpose of this review is to put industrial psychology, "human engineering," better personnel control—define it as you will—up where it belongs as the major factor in production.

Business in its cycles of development has successively passed through these periods or phases:

1—The phase when business was localized in its nature, each community being independent.

2—The era of expansion into national business, when businesses and communities developed particular aptitudes for manufacturing products which had national demand.

3—The phase of mass production, when the economies achieved by quantity production were such as automatically to create a demand for the product, and therefore very little selling was required.

4—The phase of perfecting the mechanics of production, when the placing of engineering standards against production methods began to bear fruit.

5—The phase of emphasis on selling and distribution, when mass production having been achieved and seemingly perfected, there developed a real competition in most industries, and those which could sell most effectively were the ones which survived and were the most profitable.

Ownership of American industry, as represented by its boards of directors, has demanded that management establish a control over its operation, and the variables and the guesses be eliminated insofar as it is possible to do so.

These controls are necessary for a continuingly profitable business:

The control of finance
The control of production
The control of sales
The control of public opinion

In order to budget future sales volume and establish a real sales control, progressive industry has recognized that the final word rests with the ultimate consumer, and has gone through a further step of controlling public opinion through advertising.

6—Control of Public Opinion

But to a very large extent today, so much emphasis is being laid on advertising and selling that any outstanding sales advantage for any one business tends to become neutralized by competition. Advertising has become a necessary factor.

Therefore, the most progressive businesses, and those which point the road towards tomorrow's development, have realized that the profitable survival of an individual business is dependent on its ability to deliver to the consumer the most product per dollar. This is, of course, particularly true of a period of declining prices.

So the emphasis is again being laid back upon the production executive.

Reviewing the whole job of establishing a real control of financing, producing and selling **profitably**, management has come to the outstanding weakness in mass production—that the individual worker tends to lose his identity and individuality, and therefore is robbed of much of the older incentives, which had little to do with the wages he received.

The consequence is that there has been no general improvement in the efficiency of the worker as a class.

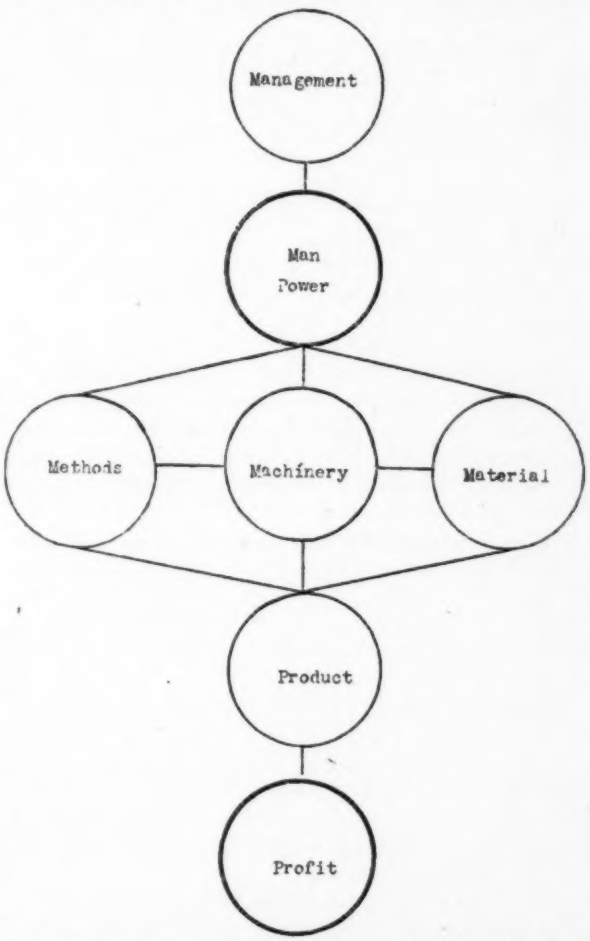
According to Deartment of Labor statistics, while the quantity productivity of the individual worker has increased from 27 per cent to 52 per cent in the period from 1914 to 1925, yet this increase has been due entirely to the increased efficiency of the method and the machinery operated by the worker.

Business—progressive business—has entered a new phase:

7—Control of Personnel

Improved Control of the Productivity of the Individual Worker

The need for the better control of the worker's attitude in his relation to his job and his management



is immediately evident when we visualize his importance in any production problem and when we show how lack of such control militates against quality and increases cost by leading to waste.

To prove the fundamental importance of the worker—and of his mental attitude and morale—let us resolve the production problem into is constituent elements of—Management; Methods; Machinery; Materials; Men.

Management, having at its disposal the factors of methods, machinery and materials, cannot act directly on them to produce a product.

All of the tangible facts of a business, on the basis of which its financial rating is established—its methods, machinery, materials and its executive personnel—are entirely lacking in the ability to produce a profit, which is the basic and economic reason for the existence of any business. It is necessary to add the other factor—man power—to produce a product and the resulting profit.

Furthermore, the effectiveness of the other factors of a business varies in direct ratio to the effectiveness with which this other factor, man power, operates.

For the improvement of physical assets and general plans and methods, the average manufacturer is willing to spend all the effort and money available. Manufacturing methods are continuously studied by individuals, industrial groups, engineering societies and institutions of learning and research. Machinery and physical equipment is constantly studied from an engineering standpoint. The willingness to invest in imroved machinery is an outstanding characteristic of American industry. Materials are bought under the most rigid specifications—in larger businesses subject to very expansive research. Yet it is quite obvious that much remains to be done to improve the attitude of management toward the man power factor. Nearly every progressive manager would like to improve the individual efficiency of his workers, but is usually stopped by the intangible quality with which he has to deal. The average technically trained man avoids the human problem whenever he can.

It is to the everlasting credit of the technically trained man that his is such a commanding position in industry today. He prides himself on the fact that he is a practical man. He deserves it. Yet he should not fail to look beyond the machine to the man operating it.

Our grandfathers used tools costing a few dollars. It is no longer a news item today to find a skilled operator running mechanical equipment which represents a cool million dollar investment. Fool proof as the set-up may be, the operator must be thinking straight and feeling straight, because a slip may cause a staggering loss.

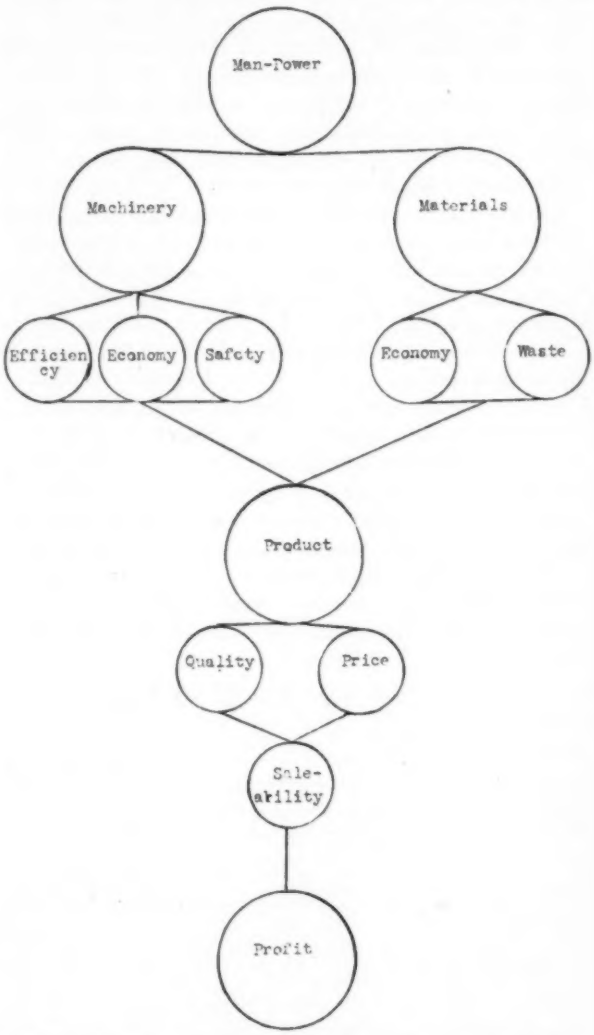
We have already established the key position of the worker and consequently his influence on the physical equipment of the operation. It is beginning to be realized that improvement in his efficiency will come from an improvement in his mental attitude and morale.

How can this improvement be made effective from the standpoint of practical management?

Obviously, by stimulating and educating the worker and making him see the importance of his individual job in relation to the entire business, and by promoting a closer meeting of minds between the worker and the management. The quantity with which we are dealing is not tangible and is not susceptible to the ordinary engineering approach.

It has been proved that the effectiveness of the executive and selling worker is improved by stimulation and education. This stimulation and education of the executive and selling personnel is not left to chance but proceeds along organized lines.

There is the additional fact that the executive is being constantly stimulated by outside contacts, by



his membership organizations such as Rotary, Kiwanis, etc., and very often by contacts with other organizations which are trying to sell him something.

The salesman in the field is being constantly stimulated by his contacts with other salesmen and by the people with whom he does business, as well as by a highly organized contact from the home office. Also, for both executives and salesmen, there is available a vast amount of business literature of an educational nature.

As compared to this stimulation and education which executives and salesmen receive, consider how little of an educational nature is available to the industrial worker and the nature of the stimulation which he receives off his job.

What Is Influencing the Worker?

The job itself offers little of stimulation. The only real incentive for development there is for a physical development of technique. By and large, the stimulation of the industrial worker off his job is likely to be of negative character, not tending to produce a better mental attitude toward that job. It is too often the stimulation of radical leaders, or sensational newspapers, and of the movies.

The movies, for instance, are constructed to entertain and they are not concerned with, or worried about, the fact that they are influencing a worker negatively when they show the hero starting out in rags at 7:31 p. m. and have him a millionaire no later than 9:23 p. m.

The worker isn't really to blame if he communes with himself after seeing such an exhibition of financial progress in 5 reels, and if he thinks "if he had a chance" or "got a sqaure deal" he, too, could do the same trick in the same way.

That's only human, and the control program must include factors to counteract this negative influence and impress upon the worker that after all—when the last movie reel has been tucked away for the night in its tin storage box—the only sure way of making a dollar is to earn it.

It must always be remembered that nearly every **interesting** influence in the worker's life outside of his work, is an influence that tends to make him dissatisfied with his income, his scale of living, or his place in the scheme of things. The American worker is on the receiving end of American selling and advertising and it all seeks to raise his scale of living.

This is not a criticism of the average worker. The average American worker is the finest in every way that has ever been available to production management. But we should recognize the influences at work which tend to disturb this situation. Management must help give the worker balance.

Few executives have put in as many years service in organized industrial relations work as has Mr. Henry S. Dennison, president of the Dennison Mfg. Co. In a recent speech before the American Management Association he said, in part, "Take advantage of the comfort of the present situation in industry to build a foundation of industrial relationships which will see us through any contingency which may arise in the future—**as it always has in the past.**"

"An egotist," says some clubhouse philosopher, "is a man who is always talking about himself when you want to talk about yourself."—Lombard News Letter.

Modern Machinery and Its Relation to Quantity and Quality Production

By GEORGE RICE

BY THE operation of the law of averages, the machinery of a mill engaged in the manufacture of pulp or paper or any other commodity can be mechanically perfect so far as the actual turning of gears and wheels are concerned and still be mechanically obsolete so far as quality and quantity production are concerned. It may be mechanically good because of the efficient manner in which it has been kept in order with new parts and attachments and be uneconomical to operate in addition to being out of date.

Furthermore, the machinery may be mechanically good and modern in design but inadequate to existing needs. Someone in authority has through an error of judgment caused the installation of one or more pieces of machinery in one or more departments which is not specially fitted for the manufacture of the line of products. Or the character of the product has been altered and the machinery which was adequate when first put in becomes inadequate. Within recent years, paper and pulp mills have been called upon to supply the artificial silk manufacturers with material for making the fine filaments for rayon fabrics. This material has to be specially made from wood, or cotton, or cotton linters, and machinery which was suitable for ordinary pulp requires changing to manufacture the stock for the artificial silk industry.

Inspection Helps Plant Maintenance

In mills where specialized plant inspection is regularly performed, it is seldom that old or worn machinery can be found. Plant maintenance includes more than the machinery, such for instance as the buildings, the power system which may be steam, electricity or water wheels; the means by which this power is transmitted to the machinery, such as belts, gears, ropes, chains or wires carrying electrical currents; the elevators for conveying material from one floor to another; the motor trucks, the yard and the storage houses. But it is of the machinery that we write. In mills where this part of the plant is given a quarterly or semi-annually or even an annual specialized inspection, the machinery will be found in far better running condition than in mills where inspections are hap-hazard and sometimes never resorted to until a machine is plainly unfit for service because of deteriorated parts or for other reasons.

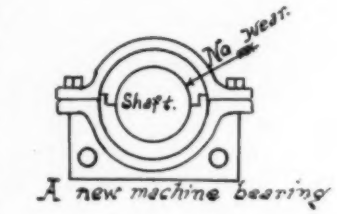
I have worked in mills in which the boss has discouraged the finding of worn, weakened or defective parts of machines owing to the cost of making replacements of those parts. Only when the actual

breakdown came and the machine had to stand idle would any action be taken toward a remedy. Then time would be lost awaiting the arrival of a new part from the builders. I have worked in other mills in which the boss would come around with a pad and pencil about once a month and inquire what new parts should be ordered to have on hand to replace parts showing indications of wear or breakage on the machines which were then running. But the boss that has the specialized inspection scheme in his plant does not have to wait for a breakdown, or for a subordinate to tell him what is needed or to go around with a pad and pencil to check forthcoming signs of breakdowns.

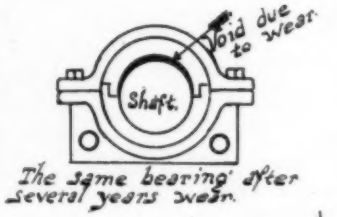
He has all of the necessary data concerning the condition of every machine in his plant in black and white.

Inspection Forms for Each Machine

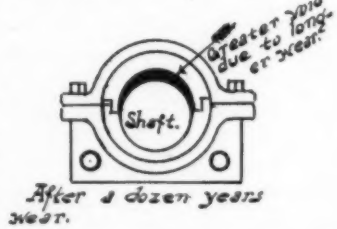
Every machine has a name or a number. Sets of inspection blanks are provided for each machine having on them the corresponding names or numbers and printed reference names of every mechanical motion and every acting part of that motion, so that when an inspection of the machine is made there is no excuse for overlooking a shaft, a gear, a cam, a box bearing, a lever, a clutch, a bolt or a screw. No one need report to the man higher up that such and such a machine or part of a machine is in a worn condition or is obsolete, for the inspection forms tell the story.



A new machine bearing



The same bearing after several years wear.



After a dozen years wear.

We will take a box bearing as an illustration. There is but little play in a new bearing and probably will not be for the first half dozen years of its service. But machinery is pushed harder than it used to be, and together with forcing to get a record production, the accompanying high speed tends to wear down both the shaft and the lining of the box as time passes. It may be ten years before the shaft at the bearing point and the lining or bushing of the box will be worn very much in the direction of the pull. But that wear will be production of play in the bearing, due to the void created with the settling of the shaft or with the stress put on the shaft. The resulting vibrations will cause loss of motion, loss of power, loss of the additional lubricating oil which will be necessary to keep the box from heating, and decreased producing capacity and sometimes a lowering in the efficiency of the machine.

The machine runs and produces, and often not much attention is given to the worn condition of the bearing. More years pass and the void in the box becomes larger, the vibrations more intensive, the machine harder to drive and its producing capacity lowered still more. The machinist of the mill may report that the bearing is worn and a new bearing is needed. The man in the office usually is a busy man. He is often told that such and such a machine needs so and so. He notices that the machines keep on running. He forgets about the application of the machinist for a new bearing for the one which needs replacement, and the matter dies then and there.

Records as Reminders

The inspection records are not so easily ignored. We will take the same bearing as an example for the recording form. The questions run like this:

Inspection Record of Machine Number 10

Part—Bearings.

Condition of main shaft bearing number 12—

(1)—Is the lining worn? (2)—Is a new lining needed? (3)—Or can it be rebabbitted? (4)—Is the shaft worn? (5)—Is the shaft sprung? (6)—Are any cap bolts missing? (7)—Is an entire new box needed? (8)—Is an entire new shaft needed? (9)—Remarks.

The man making the inspection has to put down yes or no against each item. And every part of the machine is covered in the same way. It takes some time to get accurate estimates of the condition of a machine the first time. But after once a set of forms are made up, it requires but little time and effort to keep them up to date by periodical inspections.

The mill owner knows the precise condition of every machine in his plant by these records. The year by year wear can be followed. When contemplating machinery replacements, he knows just which machines are in shape for casting out and which can be retained for a while longer. If the record of a certain machine shows that its bearings are worn to a state that abnormal friction is developed by the brake-like action of bushings which are worn unevenly, that will be the machine to go out, ahead of the one in which the bearings are in better form.

Specialized inspection records of machinery will be found convenient to have on file in the office of any mill.

To save something each month develops self-control. This power frees one from fear and gives abiding courage. Such moral strength is of far greater value than the mere possession of the money that has been saved.—*Samuel W. Reyburn.*

Current Thought by William Sibley

Obsolescence

IN MY article of last month I made the statement: "The paper industry has not been confronted with the same rapid obsolescence of machines and methods that other industries have had to sustain. Industries such as the automotive, transportation, public utility, sugar, printing, or leather have faced problems and rapid changes that were of far greater mangnitude and import than ever confronted the paper industry. This comparative freedom from upsetting tendencies has left many paper manufacturers with a hesitance to accept new ideas that were outgrown by members of other industries years ago."

In continuance of that thought let me make another statement which I believe to be equally true:

Probably no single industry has contributed more to American commerce than the automotive industry. Not alone in supplying us with the means for rapid transportation has it been a benefactor. Rather, the benefit from that industry (which is of mushroom growth in comparison to the paper industry) has in large measure come from the example it has set for all manufacturing enterprise.

Being in possession of a product that almost instantly met with popular acclaim, it faced the problem of mass production, and its preforce had to solve its own problem because there were no previous experiences or precedents upon which to draw for guidance. Machines, the most reliable that could be built, must of a necessity be produced "overnight" as it were. Large scale production was a thing of immediate necessity. Not being able to produce automobiles in the demanded quantity with existing machinery and methods it became a part of the work of automotive engineer to devise new machines and strange methods that would give the required production.

This was gambling of the highest order. Without precedent, who was to tell whether the theoretical methods and untried machinery would produce? If they did—well and good. If they did not—just so much money, energy, thought and precious time had been wasted.

That the automotive engineer has succeeded is attested to by 21 million cars, 140,000 miles of improved highways, the present imminence of the industry's position and the worried expressions of railway officials. But in achieving his success the automotive engineer has contributed incalculably to all phases of American commerce, since adaptations of their machines and methods have found their way into mills and factories of all sorts. Industry as a whole has learned more about mass production from this 40-year-old automotive trade than from any other single source.

But there is an even greater lesson to be learned from the manufacturer of automobiles. As beneficial as their mechanical contributions have been—as far-reaching as has been the rapid transportation provided—as powerful as has been the lesson of inter-company co-operation—there remains yet a greater, but frequently overlooked lesson—that which has to do with obsolescence.

Practically speaking, the automotive industry is only 30 years old. Yet in that time the methods by which automobiles are produced have changed completely—more than four times. Changing methods invariably means changing machinery. Does this mean anything to the paper manufacturer? Would he consider it possible to set up in business with the conviction that he was going to have to scrap and completely re-equip his mill every six or seven years? The paper maker, entering upon such a 30-year career would hesitate; and, perhaps, rightly so. But that is exactly what the automobile maker has had to do. If we of the paper industry are bothered over the problems of obsolescence (and they are growing ever more insistent day by day), we can learn much from the Detroiters.

It was only a few years ago that the frames for automobiles were made in several pieces that were riveted and bolted together. Today, a chassis frame is stamped out of one large piece of metal, then shaped to suit. Back in the old Prest-O-Lite days, the engine was cast in several parts—a cylinder at a time—then assembled. Now, the entire power plant—4, 6, or 8 cylinders—are cast enbloc. Trans-

missions have undergone three complete changes since the first of the 1900's. Some of these alterations in design and methods lasted only a short time. Refinements followed on the heels of improvements —and each change involved the scraping of machinery and methods long before they wore out. In the motor industry, machine upon machine has been junked and replaced before even a bearing became worn enough to warrant replacement.

Efficiency vs. Ability to Run

With our industry grimly hanging to methods and machinery now fifty years old—can this recital of facts mean anything?

Not so long ago I visited a paper mill in Massachusetts—there to find long overhead line shafts with screaming bearings of the babbitted type. The condition I found had been continuing for ten years. All that time the bearings had screamed for oil or better alignment. All that time coal had been thrown into the maw of the fire box only to have its steam power wasted in screams and needless friction. All that time, a better type of bearing (ball, roller, tapered, or whatnot) was available at a cost in no way approximating the cost of wasted coal alone.

In another midwestern mill I found in use the same low, shallow beaters (set up on concrete bases) that had been installed a quarter century before. From the condition of the rolls one might assume they had started their circular way when Bryan was advocating his 16 to 1 policy and the Joe Cannon stogie was a national emblem.

In still another mill the paper machine was jogging along leisurely at its usual rate of 175 feet when with 10 per cent more power, no more men, and a simple change in power transmission equipment it could have been speeded up and made to produce 60 per cent more paper. And the owners were seriously contemplating the erection of another mill!

As THE PAPER INDUSTRY has often said, editorially, this industry does not need more mills. We have more than enough now. This, however, does not mean we do not need more machines. Indeed, we have great need for re-equipment without end all the way from paper machines to power plant equipment. And, frankly, we would have the needed and much improved equipment if we were of the minds of automobile manufacturers.

Not all mills are in a deplorable condition by any manner of means. Many of our present-day plants are constantly installing new and improved equipment—and gaining thereby. But let some car manufacturer equip his plant with machinery of a type that graces some of our paper mills, and that manufacturer, in the highly competitive automotive industry, would promptly go into bankruptcy.

Today is not yesterday. 1928 is not 1898. The degree of efficiency of any machine cannot be determined by its ability to run. The only possible way to determine whether or not a machine is a money-making asset is to compare its output and cost with the improved machines now available.

Let us assume, for instance, that a boiler plant is burning mine-run and is being fired by means of an overhead bunker and endless stoker. This plant was installed, we will assume, in 1920. Boiler plant equipment should last 20 years. With proper care it will do even better. Does that mean that this plant should be kept in operation until 1940? Not at all. Let some manufacturer produce and prove he has equipment that will lift the level of the boiler plant efficiency 15 per cent—and the old plant promptly becomes too costly to operate. In the interest of what might be done, the eight-year-old equipment (far from being worn out) must be scrapped and the improved equipment installed.

Suppose, for instance, some mill uses ten million gallons of water a day. All that water must be pumped—the pumps operated by steam. Regardless of when or at what cost those pumps were installed, if they cannot pump the water as rapidly or cheaply as a new and improved pump—replacement is necessary in the interest of economy and efficiency.

Obsolescence, in meaning, is a big word. It is far bigger than the old and now nearly obsolete "amortization." It is becoming increasingly difficult—quite impossible in fact—to predetermine the rate of speed at which costs may be charged off. With the constantly enlarging scope of automatization—the rapid rise of far-reaching improvements brought about by engineers from every field of endeavor—we find it increasingly necessary to buy equipment solely on the basis of economic necessity. To buy machinery or adopt methods on the basis of what they will produce in a given length of time is a system that died with the passing of the kerosene lantern. This is a dynamic age. Nothing today can be static and long exist. If, out of necessity to produce more or effect savings today, it becomes necessary to buy certain equipment, that purchase should be made. If, tomorrow, it becomes necessary to replace that new equipment to gain the advantages of a still further improved machine, that replacement must be made. Physical condition or degree of wear cannot enter into purchasing considerations today.

Paper men have need to learn what the car manufacturer learned twenty years ago—that a machine or method is efficient only so long as there is available nothing better.

The Paper Industry 1928 Safety Contest

March Scores Only

45 Mills Have Perfect Month

PERFECT SCORES

	PARTICIPANT	MILL	LOCATION
Group A	Champion Coated Paper Co., The	No. 2	Hamilton, Ohio
	Nekoosa-Edwards Paper Co.	Port Edwards	Wisconsin
	Northwest Paper Co., The	Cloquet	Minnesota
	Kimberly-Clark Co.	Niagara	Wisconsin
	Kimberly-Clark Co.	Badger-Globe	Neenah, Wis.
Group B	Mead Fibre Co.	Kingsport	Tennessee
	St. Croix Paper Co.	Woodland	Maine
	Nekoosa-Edwards Paper Co.	Nekoosa	Wisconsin
	Marinette-Menominee Paper Co.	Marinette	Wisconsin
	Finch, Pruyn Co., Inc.	Glens Falls	New York
	Michigan Paper Co.	Plainwell	Michigan
	Hollingsworth & Vose Co.	West Groton	Massachusetts
	American Writing Paper Co.	Beebe-Holbrook	Holyoke, Mass.
	American Writing Paper Co.	Crocker	Holyoke, Mass.
	Strathmore Paper Co.	No. 1 Mittineague	Massachusetts
	Strathmore Paper Co.	No. 2 Woronoco	Massachusetts
Group C	Sorg-Oglesby-Smith Paper Co.	Oglesby	Middletown, Ohio
	International Paper Co.	Montague	Turners Falls, Mass.
	Marinette & Menominee Paper Co.	Menominee	Michigan
	American Writing Paper Co.	Lynden	Holyoke, Mass.
	Adams Bag Co.	Chagrin Falls	Ohio
	American Writing Paper Co.	Parsons	Holyoke, Mass.
	Kimberly-Clark Co.	Atlas	Wisconsin
	Defiance Paper Co.	No. 2	Niagara Falls, N. Y.
	American Writing Paper Co.	Nonotuck	Holyoke, Mass.
	Mead Pulp and Paper Co.	Peerless	Dayton, Ohio
	International Paper Co.	Webster	Orono, Maine
	Franklin Board & Paper Co.	Franklin	Ohio
	Gardner & Harvey Co.	No. 3	Middletown, Ohio
	Thilmany Pulp & Paper Co.	Tissue	Appleton, Wis.
	Union Bag & Paper Corp.	No. 5	Hudson Falls, N. Y.
	International Paper Co.	Livermore Falls	Maine
	Warren Mfg. Co.	Hughesville	Riegelsville, N. J.
	Union Bag & Paper Corp.	Allen	Hudson Falls, N. Y.
	American Writing Paper Co.	Mt. Tom	Holyoke, Mass.
	Sorg-Oglesby-Smith Paper Co.	Smith	Middletown, Ohio
	Kimberly-Clark Co.	Neenah	Wisconsin
	International Paper Co.	Riley	Maine
	United States Gypsum Co	Gypsum	Ohio
	Warren Mfg. Co.	Riegelsville	New Jersey
	American Writing Paper Co.	Wauregan	Holyoke, Mass.
	United States Gypsum Co.	N. Kans. City	Missouri
	United States Gypsum Co.	Lancaster	Ohio
	American Writing Paper Co., Inc.	Platner-Porter	Unionville, Conn.
	United States Gypsum Co.	Oakfield	New York

IMPERFECT SCORES

GROUP A				GROUP B				GROUP C			
		Points				Points				Points	
Key	Rank	Credit	Debit	Key	Rank	Credit	Debit	Key	Rank	Credit	Debit
A- 5	6	526.900		B-27	12	449.030		C-49	30	365.300	
A- 2	7	525.870		B-14	13	421.645		C-13	31	281.230	
A- 9	8	486.445		B-33	14	398.800		C-11	32	202.055	
A- 8	9	474.245		B-35	15	287.000		C-17	33	199.870	
A- 7	10	445.600		B-34	16	251.470		C-46	34	165.630	
A-11	11	347.845		B-11	17	221.385		C-37	35	91.070	
A-14	12	322.385		B-13	18	220.800		C-14	36	69.600	
A- 3	13	264.830		B-22	19	206.500		C-16	37	54.230	
A-22	14	249.445		B-17	20	188.655		C-50	38	37.000	
A-25	15	217.115		B-36	21	180.085		C- 1	39		18.470
A-16	16	157.030		B-26	22		5.885	C-31	40		84.785
A- 4	17	35.315	2.485	B-23	23		52.845	C-48	41		90.570
A-17	18		29.755	B-12	24		89.700	C-12	42		152.915
A-24	19		33.885	B- 4	25		104.085	C-54	43		162.170
A-10	20		211.645	B- 2	26		117.930	C-35	44		168.870
A-26	21		309.385	B-31	27		169.430	C-10	45		180.145
A-23	22		526.770	B-32	28		172.215	C-40	46		199.230
A-18	23		809.800	B- 5	29		211.985	C-21	47		203.685
A-21	24		1336.530	B- 7	30		283.400	C-23	48		247.655
A-20	25			B-29	31		311.285	C-59	49		375.955
				B-19	32		393.745	C- 8	50		703.270
				B- 6	33		841.245	C- 7	51		737.970
				B-30	34		969.600	C- 5	52		806.200
				B- 9	35		1299.130	C-33	53		884.870
								C- 4	54		911.745
								C-22	55		974.830
								C-18	56		1116.055
								C-20	57		1398.030
								C-34	58		1519.830
								C- 3	59		1654.245
								C- 6	60		3390.115

Withdrawn, May 1—A-19
C-36

Not reported—B-8

Cameron to Attend International Safety Parley

W. H. Cameron, managing director of the National Safety Council, Chicago, sailed for Europe May 5, as an unofficial representative of this country at the World Safety Congress which is to be held under the auspices of the International Labor Conference, League of Nations Union, at Geneva, Switzerland, the latter part of May and first of June.

In 1923 Mr. Cameron made a similar trip, and delegates from all parts of the world were amazed at the progress made by this country in the prevention of accidents. While abroad, Mr. Cameron will visit a number of foreign notables in the hope of interesting them to participate in the Seventeenth Annual Safety Congress to be held in New York City, October 1 to 5, 1928.

Fewer Accidents First Quarter 1928 at I. P. Co.

With two and one-half per cent more employes in the mills of International Paper Company during the first quarter of 1928 than the corresponding period of 1927, there were twenty-seven per cent fewer lost time accidents.

The average number of days lost by employes through accidents per 100 men employed, was twenty-five per cent less in the first three months of this year than the corresponding quarter of 1927 and thirty-six per cent less than during the same three months of 1926.

A record attendance is expected at the Fourth Annual Fox River Valley Safety Conference to be held June 6, 1928, at Oshkosh, Wis. The forenoon will be given to sectional meetings, the afternoon to a general session. Among the speakers at the meeting of the Pulp and Paper Section are H. G. Noyes, Commissioner V. Wrabetz, L. J. Parrish and John Lundrigan.

The Paper Industry 1927 Safety Contest

Accumulative Severity Rates of Mills in Group C, as of March 31, 1928

Participant	Mill	Rate	Participant	Mill	Rate
Kimberly-Clark Co.	Neenah	0	Gardner & Harvey Co.	No. 2	28
International Paper Co.	Riley	0	Union Bag & Paper Corp.	Allen	.42
U. S. Gypsum Co.	Gypsum	0	International Paper Co.	Livermore	.48
Upson Company, The	Board	.06	Robertson Paper Co.	Montville	.52
Lincoln Pulp & Paper Co.	Lincoln	.07	Union Bag & Paper Corp.	No. 5	.54
Kimberly-Clark Co.	Atlas	.08	Lincoln Pulp & Paper Co.	Lyhster	.61
International Paper Co.	Webster No 9	.13	Itasca Paper Co.	Minnesota	.66
Gardner & Harvey Co.	No. 1	.15	Mead Pulp & Paper Co.	Peerless	.78
Gardner & Harvey Co.	No. 3	.20	Union Bag & Paper Co.	Fenimore Paper	2.66
Adams Bag Co.	Chagrin Falls	.21	Northwest Paper Co.	Brainerd	2.85
International Paper Co.	Winnipiseogee	.25	Lincoln Pulp & Paper Co.	Sulphite	3.28
Bergstrom Paper Co.	Neenah	.26			

Group A—Neekoosa-Edwards Paper Co., Combined Mills .68

Group B—International Paper Co., Niagara Falls .27

May 1928

The Chemistry of Wood Cellulose—IV*

Isolation, Analysis and Chemical Properties of Cellulose from Red Spruce (Picea rubens)

By EDWIN C. JAHN** and LOUIS E. WISE

Contribution from the Chemical Laboratory of the New York State College of Forestry at Syracuse, N. Y.

INTRODUCTION

THE PRESENT investigation was undertaken with the object of obtaining a number of cellulose preparations from a single species of wood, by using varying methods of isolation. Incidentally the methods of isolation were also studied in part, and the various cellulose samples were examined analytically with a view toward determining, as far as possible, their homogeneity and purity. The research presents a step in a larger investigation which involves a more fundamental study of the wood celluloses themselves with a view towards determining whether their chemical constitution is changed by changing the technique of isolation, and whether or not the wood cellulose preparations are identical with cotton cellulose.

Cotton cellulose, by careful purification will yield a cellulose of extreme purity and with well-defined properties. For this reason normal cotton cellulose is generally accepted as standard cellulose. This fact has naturally led to a number of investigations on the similarity or dissimilarity of wood cellulose with cotton cellulose. Wood cellulose, as isolated by any present day method, presents no such homogeneity as does cotton cellulose, and even varies in nature and purity to a large extent, depending upon the method of isolation employed and the species of wood from which it is obtained.

Wood cellulose when treated in the cold with mercerizing strength alkali (17.5 per cent), followed by careful washing, yields a product that approaches cotton cellulose in its chemical properties and purity. This normal cellulose is considered identical with cotton cellulose by Heuser, Bodeker, Herzog and Jancki, and this seems to be accepted by a number of chemists. The investigators mentioned have furnished strong experimental evidence of chemical similarity of the two kinds of cellulose...However, the data, taken by and large, are incomplete.

In this article, the product obtained by any of the usual methods of isolation will be termed "crude cellulose." The term "normal" or "alpha" cellulose will be used to designate cellulose which has been obtained by treatment of this crude cellulose with cold 17.5 per cent NaOH. Even though this latter term may be somewhat arbitrary, it appears justifiable in that it represents a wood cellulose, which by a certain treatment, closely approaches a single chemical individual.

EXPERIMENTAL PART

I—The Scope of the Laboratory Work

The investigations carried out in the laboratory briefly covered the following points:

1—Cellulose was isolated from red spruce wood by five methods, embodying four distinct types of chemical action; namely, the halogenating action of chlorine, the action of phenol which forms a condensation product with lignin, the action of alkali in the soda and sulphate processes, and by the combined action of calcium bisulphite and sulphurous acid.

2—Portions of the isolated crude cellulose were bleached, and other portions were converted into alpha cellulose.

3—An individual and comparative analytical study was made of each of the prepared celluloses. This determination included alpha cellulose, furfural and pentosans, residual lignin, and percentage carbon and hydrogen.

4—The carbon and hydrogen determinations were made for the purpose of studying this method of analysis as a preliminary test for the purity of cellulose.

5—The action of alkali on cellulose was briefly studied. This study included the checking of D'Ans and Jager's[1] work concerning the maximum solubility of cellulose in alkali and the effect of retreatment of cellulose with alkali.

6—The relation of pentosans and cellulose were studied after the action of alkali of varying strengths on crude cellulose and after retreatment with alkali.

II—Source of Wood and Its Preliminary Preparation

The cellulose prepared for the investigations carried out in this work, was isolated entirely from sound red spruce (Picea rubens). Two logs were obtained, one from Hinckley, N. Y., through the courtesy of Mr. H. E. Weston, and the other from Wanakena, N. Y., through the kindness of Professor J. F. Dubuar. The log from Hinckley was about 12" in diameter and that from Wanakena about 7".

The wood was prepared for cellulose isolation in two different ways: First, by cutting into small chips, and second, by turning into sawdust. The chips were prepared entirely from the wood from Hinckley by sawing the log into sections about ¾" thick at an angle of 45°. These sections were then broken up into chips about ⅛" to ¼" thick and ½" to 1" wide. The chips were thus the same size as those used in the chemical wood pulp industries.

For preparing sawdust a circular wood working saw was used. The guide was placed very close to the saw so that a section only as wide as the saw edge was cut through each time the log was brought against the saw. In this manner almost the entire log could be turned into sawdust, and a very representative product obtained. The sawdust was collected by a pail under the spout of the saw. All coarse and fine material was rejected by screening through 20 and 60 mesh sieves. By the use of two circular sieves which fitted into each other, the sifting was performed in one operation. The material which passed through the 20 mesh and was retained on the 60 mesh screen was stored in sealed fruit jars. The sawdust was largely prepared from the log from Wanakena.

III—Chemical Analysis of the Wood Used

The sawdust prepared from the Wanakena wood was carefully analyzed by isolating certain fractions, and determining such groups as pentosans, methoxy, mannans, and cellulose. The complete proximate analysis is given in Table I.

Prior to the final determinations several orientation experiments were made for soluble pentosans and cellulose, following the procedure of Dore.[2] The results obtained are given in the following list:

On oven dry basis—

Furfural from chlorination filtrates	2.45 per cent 2.61 per cent
Total pentosans in chlorination filtrates	4.13 per cent 4.45 per cent

* Three previous papers on the Chemistry of Wood Cellulose have been published in *Industrial & Engineering Chemistry*, 1922 and 1923.

** This article forms a part of the thesis presented by Mr. Jahn in partial fulfillment of the requirements for the M. S. degree at the New York State College of Forestry. Mr. Jahn now holds a Fellowship at McGill University granted by the Canadian Pulp & Paper Association.

[1] Cellulosechemie, *6*,13 (1925).

[2] J. Ind. Eng. Chem., *11*,556 (1919); *12*,264 (1920).

On air dry basis—
Cellulose .....51.24 per cent
49.89 per cent
49.78 per cent
52.37 per cent

Table 1
Analysis of Red Spruce

Analysis of	Oven Dry Basis (percentage) Individual Analyses	Average
% Alcohol Soluble Material	1.21 1.29	1.25
% Benzene Soluble Material	0.61 0.59 0.63	0.61
% Hot Water Plus Acetone Extractives	2.64	2.64
% Furfural from Chlorination Filtrates	3.09 2.93	3.01
% Total Pentosans in Chlorination Filtrates	5.26 5.00	5.13
% Furfural from original Wood	6.81 6.67	6.74
% Total Pentosans in Wood	11.62 11.35	11.49
% Methoxy	4.57 4.55	4.56
% Mannans	5.44 2.53 4.27 6.53	4.69
% Lignin	30.04 30.05	30.05
% Cellulose (Corrected for Residual Lignin)	57.35 57.42	57.39

The wide variation between the results of the individual mannan determinations could not be accounted for.

IV—Isolation of Cellulose

Five methods of isolation were employed: (1) chlorination, (2) the action of phenol, (3) the soda process, (4) the sulphate process, and (5) the sulphite process.

(A) Cellulose Isolated by Chlorination (Cross and Bevan)—Large batches of cellulose, from 30 to 48 grams each, were prepared by the Cross and Bevan chlorination method as modified by Renker and described by Schorger.[3] Certain changes in apparatus and technique were necessary to enable the convenient handling of the large quantities of material used. Also the time of exposure to chlorine was varied in each run. A detailed description of the procedure used is as follows:

Thirty to 40 grams of sawdust were wrapped tightly in the form of a sausage in a piece of mercerized cotton cloth and tied securely with string. The size and shape of the bundle was made convenient for slipping into a 700 cubic centimeter wide mouth Erlenmeyer flask. The bundle of sawdust was suspended in the flask under a reflux condenser and extracted first with benzene and then with 95 per cent alcohol. The length of each extraction varied from 6 to 10 hours depending upon the volume of the sample. These long periods of extraction were used to insure the complete removal of all benzene and alcohol soluble extraneous materials from the mass of sawdust. Two or three extractions were run simultaneously depending upon the amount of material desired for chlorination.

[3] J. Ind. Eng. Chem., 9,556,561 (1917).

Chlorinations were carried out in three 1-liter bottles connected in series as indicated in the photograph. The moist extracted sawdust was evenly divided between the three bottles and chlorine gas drawn gently through from a cylinder by a very mild suction by means of a water pump. This method at the same time conveniently prevented the excess of gas from escaping into the atmosphere. The gas was drawn through at the rate of 50 to 60 bubbles per minute, indicated by noting the flow through the wash bottle. During chlorination the bottles were laid on their sides and occasionally shaken to spread out the sawdust as much as possible and given an even exposure to the gas. Immediately on the close of each chlorination period, 100 cubic centimeters of sulphurous acid (50 grams SO_2 per liter) were added to each bottle to prevent undue oxidation of the cellulose. The material was then filtered on a Büchner funnel with a filter of mercerized cotton cloth, and washed with cold water to remove the sulphurous acid, and finally with hot water.

The residue on the filter was transferred to a 500 cubic centimeter beaker and a 3 per cent solution of Na_2SO_3 added to cover the material, and the entire mixture heated with frequent stirring, on a water bath for ¾ hour. After this treatment, the material was returned to the filter and washed thoroughly with hot water. The alternate treatments with chlorine and Na_2SO_3 solution were continued in this manner until the residue became white. The crude cellulose was then washed with sulphurous acid solution, cold water, and finally hot water to remove all traces of sulphurous acid solution. Drying was carefully carried out by spreading the material in beakers and heating for 16-24 hours in an electric oven at a temperature of 55° to 85°.

In each case 14 to 15 chlorinations were necessary to delignify the wood. The length of the individual chlorination periods had no effect on the number of periods required. Table 2 outlines in brief each chlorination that was made:

Table 2
Data on Chlorination of Red Spruce Sawdust

	Batch I	Batch II	Batch III	Batch IV
Grams Sawdust Oven Dry	79.4	72.1	91.5	93.3
Length of each Chlorination Period in Minutes	25 20 20 20 20 20 15 10 10 10 10 10 10 3	20 15 10 10 10 10 5 3 3 3 3 3 3 4	10 10 10 5 5 5 3 3 3 4 3 3 3 3 3	5 3 3 3 3 3 3 3 3 3 3 3 3 3
Grams Crude Cellulose	30.6	34.2	42.7	48.2
Yield	38.5%	47.4%	46.4%	51.5%
Color of Product	Pure White	Pure White	Pure White	Slightly Cream Colored

The present yields are not to be taken as quantitative because considerable material was lost on the filter cloth by the continual transferal. Batch IV was the only one in which particular care was taken to approach a quantitative yield.

(B) Cellulose Isolated by the Action of Phenol (Carbolic Acid)—Six batches of crude cellulose were made by the phenol method, following the procedure given by Kalb and Schoeller[4], with certain changes. The amount of sawdust used in each case ranged from 14 to 24.5 grams.

The wood was given a preliminary treatment by successive extraction with water, 80 per cent acetone, and 100 per cent

[4] Cellosechemie 4,37 (1923).

acetone for periods of 2.2 and 2.5 hours respectively. Each sample was extracted under a reflux by tying in a cloth as described under the chlorination method. The material dissolved out under these conditions was found to amount to 2.64 per cent of the oven dry weight of the wood.

The extracted sample was placed in a large test tube 2" wide and 11.5" long and the necessary amount of dry phenol added. Instead of using 50 grams of phenol per 4 grams of sawdust, 40 to 45 grams of phenol were used on the basis of 4 grams of wood. Concentrated HCl to the amount of 0.08 per cent of the weight of phenol used was added from a burette. The test tube was then stoppered with a cork having a hole to admit a long heavy glass stirring rod. The test tube was placed in a large beaker containing water kept at 96° to 98°C for 1.5 hours. During this time the mixture was frequently stirred.

After heating, the contents of the tube were washed out into a beaker with 400 cubic centimeters of water and 65 cubic centimeters of 2 per cent NaOH. The residue was collected on a mercerized cotton filter in a Büchner funnel and washed with cold and then hot water. One hundred cubic centimeters of acetone were allowed to drip through the mass. This was followed by washing with 50 per cent acetone, cold water, 50 cubic centimeters of 2 per cent acetic acid, and finally with hot water. The material was dried to constant weight at 100°C. In every case, the crude cellulose obtained was brown and retained a woody structure.

Each batch was run quantitatively. As indicated in Table 3, the yields were nearly identical in every case.

The crude cellulose from batches I and II was bleached with 150 cubic centimeters of bleach liquor containing 7.5 grams of Cl per liter. The bleaching was carried out for 1 hour at 22°C, and the temperature then gradually raised to 55°C over a period of 0.5 hour. The bleached cellulose was thoroughly washed with cold water, 5 per cent acetic acid, hot water, and finally with alcohol and ether. The residue was pure white but still retained a woody appearing structure. The amount lost by bleaching is low. On an underbleached sample (bleached for 45 minutes), which still had a faint yellow color, the yield was 99.5 per cent.

(C) Cellulose Isolated by the Soda Process—A crude cellulose was prepared in a manner similar to that used in production of soda pulp in a small rotary iron digester. Eleven hundred grams of chips, with a moisture content of 10 per cent were placed in the digester with 260 grams of NaOH (25 per cent on oven dry weight of the chips) and 7,920 cubic centimeters of water (8:1 liquor ratio). The digester was brought to a pressure of 100 pounds in 1 hour and maintained at this pressure for 6 hours. At the end of the cook, the stock was removed and thoroughly washed with hot water. The excess of water was then squeezed out by a small press. The moisture content was determined on a sample of the pulp, and the yield calculated. A yield of approximately 48 per cent on the basis of oven dry wood was obtained. The pulp was well cooked and of excellent quality.

About 288 grams (oven dry weight) of the pulp were bleached with 18 per cent of 35 per cent bleaching powder for 6 hours at 60°C. This bleach liquor was then drained off and fresh bleach added. At the end of two more hours, the pulp was bleached to a pure white. The stock was then repeatedly washed with hot water to remove all traces of the bleach liquor. The bleached pulp was pure white and of very good quality.

Both the bleached and unbleached pulps were made into pulp sheets. Each sheet was made by pouring about 500 cubic centimeters of thick stock upon a small circular mould (8" in diameter) and the excess water drawn out by suction. The wet pulp cake was then removed from the wire and placed between two filter papers and two blotting papers. All the sheets were slightly pressed in a hand press to remove excess water, and then dried in an electric rotary dryer at low temperature. The pulp was thus made into a form which would be conveniently handled and stored.

(D) Cellulose Isolated by the Sulphate Process.—Sulphate pulp was obtained by autoclaving chips with a solution of NaOH and Na_2S in the rotary digester. Six hundred ninety-one grams of chips (6 per cent moisture) were placed in the digester with 130 grams of NaOH (20 per cent on oven dry chips), 32.5 grams Na_2S (5 per cent on oven dry chips), and 6134 cubic centimeters of water (9.5:1 liquor ration). The digester was brought to a steam pressure of 100 pounds in ¾ hour and maintained at this pressure for 4.5 hours. The pulp was then removed and thoroughly washed. A yield of 54% on the basis of oven dry wood was obtained. The pulp was well cooked and of good quality.

Three hundred grams (oven dry) of the pulp were bleached with 20 per cent of 35 per cent bleaching powder for a period of 15 hours at room temperature. The bleached material was then thoroughly washed with hot water. Pulp sheets were made in the manner already described. The bleached pulp was slightly cream colored, but of very good quality.

(E) Cellulose Isolated by the Sulphite Process—Two batches of sulphite were prepared by autoclaving wood chips in a stationary lead lined digester with a solution of sulphurous acid and calcium bisulphite. The pressure was brought up to 70 pounds in 4 hours and maintained at this pressure until the end of the cook, or for 7 hours. Table 4 gives the details of both cooks:

Table 3

Data on Pulp Batches prepared by the Phenol (carbolic acid) Method

	I	II	III	IV	V	VI
Grams Sawdust (Oven dry extracted)	14.000	14.000	19.900	19.185	24.482	21.156
Grams Phenol used	140.0	154.00	218.9	211.03	275.4	238.0
% HCl	0.08	0.08	0.08	0.08	0.08	0.08
Temperature	96–98°C.	96–98°C.	96–98°C.	97°C.	97°C.	97°C.
Time in Hours	1.5	1.5	1.5	1.5	1.5	1.5
Grams Crude Cellulose	6.915	6.805	9.663	9.3539	12.135	10.410
% Yield on basis oven dry extracted wood	49.39	48.60	48.65	48.75	49.56	49.26

Table 4

Data on Sulphite Cooks

	Cook I	Cook II
Grams Chips Air Dry	620	800
Grams Chips Oven Dry	587	744
Liquor Analysis % Total SO_2	6.57	6.50
Liquor Analysis % Combined SO_2	1.13	1.40
Liquor Analysis % Free SO_2	5.44	5.10
Cubic Centimeters Liquor	3700	4056
Temperature	155° C	155° C
Pressure	70 lbs.	70 lbs.
Cooking Time	11 hours	11 hours
Grams Bleached	200	300
% of 35% Bleach	20%	20%
Temperature During Bleaching	90° F	90° F
Time of Bleaching	3.5 hours	3.5 hours

Unfortunately, accurate yield figures were not obtained. The pulp was easy bleaching and of excellent quality.

Both the bleached and unbleached pulp were prepared and stored in the form of sheets as described above.

V—Preparation of Alpha Cellulose

Several 10 gram-lots of alpha cellulose were prepared from the crude cellulose, for subsequent analyses and investigations. The procedure followed was that of Schwalbe as modified by Opfermann[5]. The digestion with alkali was carried out in each case under hydrogen gas to eliminate the possibility of oxidation. A contant temperature of 22°C was maintained so that the action of the alkali would be uniform in all samples. An outline of the method used is as follows:

Ten grams of cellulose were incorporated with 50 cubic centimeters of 17.5 per cent NaOH in a 250 cubic centimeter Erlenmeyer Flask. Before the addition of the alkali the air was displaced with hydrogen gas. The flow of gas through the flask was continued briskly during the digestion. A temperature of 22°C was maintained by immersing the flask in water held at that temperature. Digestion was continued for 30 minutes during which time the cellulose was tamped down evenly to break up all lumps. For this purpose a stirring rod with a flattened end was used. A double holed stopper was used in the flask; one hole to admit the tube conducting the hydrogen, and the other to allow the stirring rod to pass through At the end of the digestion, the mass was loosened with the aid of 50 cubic centimeters of 2 per cent NaOH and immediately filtered by suction on a funnel supplied with a frittered glass plate or a Büchner funnel carrying a mercerized cotton cloth filter. The residue was then washed successively with 50 cubic centimeters of 2 per cent NaOH and cold water in 50 cubic centimeter portions (until the filtrates were no longer alkaline), 100 cubic centimeters of 5 per cent acetic acid, and finally with 500 cubic centimeters of hot water in 100 cubic centimeter portions.

[5] Translated by C. J. West in *Paper*, 1‡,19 (1921).

To facilitate the washing of the cellulose and to insure a more complete removal of the alkali and acetic acid, the residue was not washed on the filter but transferred to a beaker and stirred with the portion of water. This filtrate was drained off each time by throwing the residue on the funnel and the cellulose was then returned to the beaker. After this careful washing, the material was treated with boiling 95 per cent alcohol in a beaker, After stirring thoroughly the alcohol was drained off and squeezed out, and the cellulose washed with ether, which was in like manner removed. The cellulose was then spread out in beakers and dried at 100°-105°C.

Table 5 gives the appearance of alpha cellulose prepared from the different crude celluloses.

At first, the cellulose was not given the alcohol-ether treatment, and great difficulty was encountered in drying. The alpha cellulose prepared from the Cross and Bevan cellulose almost invariably turned a dark gray upon drying in the oven at 100°-150°C. There were a few exceptions in the case of the quantitative alpha cellulose determinations. However, the alpha celluloses prepared from the crude celluloses by phenol and by the soda, sulphate and sulphite processes were not noticeably changed by drying at these temperatures. Repeated preparations were made with Cross and Bevan cellulose and extreme care was taken in washing, but the difficulty was not obviated. An attempt was then made to prevent darkening by carefully drying at 60°C and then in a vacuum dessicator over P_2O_5. Cellulose dried in this way remained pure white. Pentosan determinations on the cellulose dried in this manner and on the gray material which had been dried at 105°C showed that the graying effect was not correlated with changes in the pentosan or furfural yielding content.

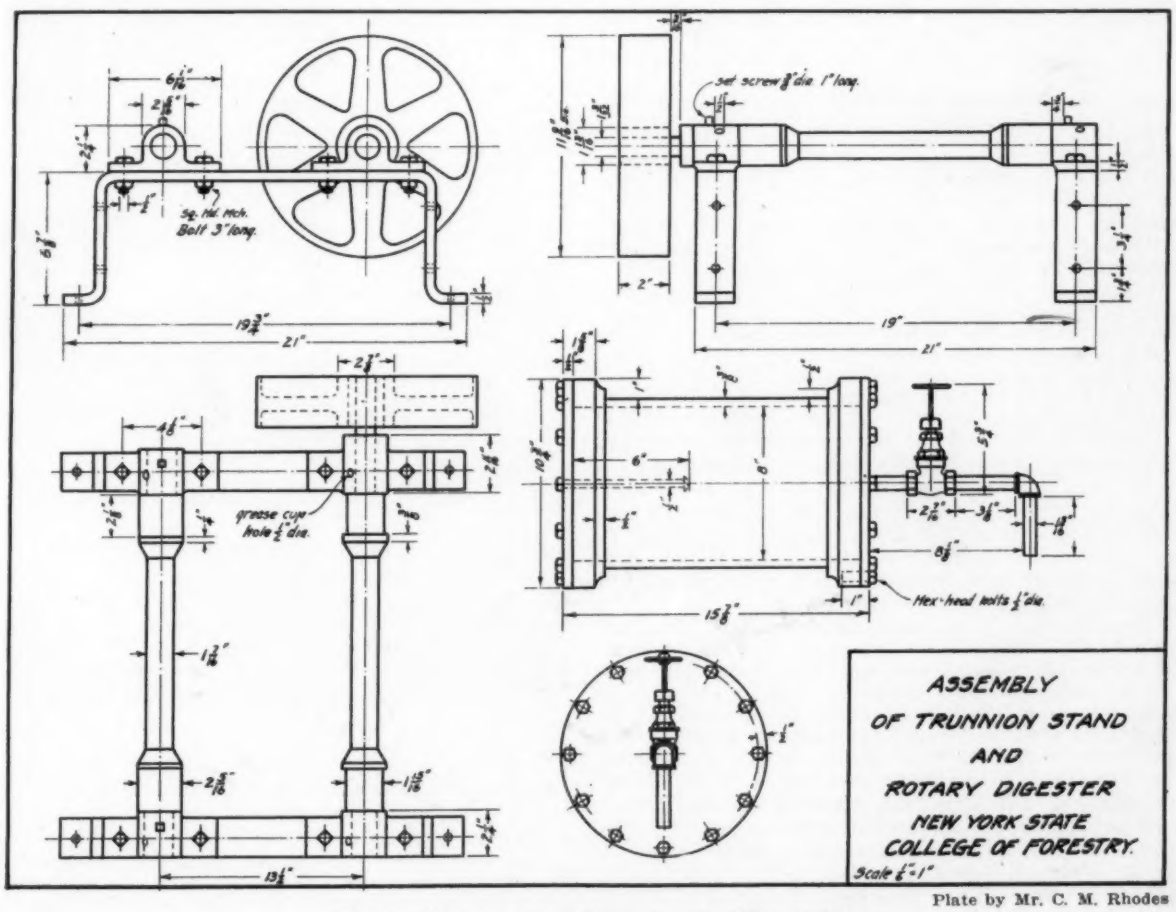


Plate by Mr. C. M. Rhodes

Detail of digester used in making soda and sulphate cooks

	Furfural	Total Pentosan
Gray Alpha Cellulose.....	1.14	1.98
White Alpha Cellulose.....	1.14	1.97

The substance which caused the graying of the alpha cellulose from Cross and Bevan cellulose, was finally completely removed, by stirring the cellulose in a beaker with boiling 95 per cent alcohol, squeezing out the alcohol, and washing with ether. The cellulose was then dried for ten hours at 105°C, at the end of which time, it still remained pure white. Two quantitative determinations were carried out to ascertain the amount of the material which was removed by the alcohol and ether. The alpha cellulose for this purpose was prepared from a mixture of 5 grams each of Batches II and IV of the Cross and Bevan cellulose. The loss in each case was negligible, amounting to 0.013 per cent and 0.016 per cent respectively. The filtrates were evaporated down, until a grayish white substance with a crystalline appearance settled out. No chemical examination of the material was made.

Table 5

Color and Appearance of the Alpha Celluloses

Crude Cellulose Used	Appearance of Alpha Cellulose
Cellulose by Cross & Bevan	Pure white, fluffy
Cellulose by Phenol, Unbleached	Light brown; No color change, retains somewhat woody structure
Cellulose by Phenol, Bleached	Pure White, retains somewhat woody structure
Bleached Soda Pulp	Pure white
Bleached Sulphate Pulp	Slightly cream colored, (no color change)
Bleached Sulphite Pulp	Slightly cream colored (no color change)

The treatment with hot alcohol and ether was therefore found necessary to increase the purity of Cross and Bevan alpha cellulose, and was accordingly applied to all the batches of alpha cellulose prepared. This treatment appreciably lightened the color of the alpha cellulose from the unbleached cellulose by phenol, and also noticeably whitened the alpha cellulose prepared from the other crude celluloses.

Preparatory to the treatment with alkali, the cellulose must be finely divided so that there will be complete and uniform contact with the NaOH. The Cross and Bevan cellulose and the cellulose by phenol needed no preliminary treatment, but the soda, sulphate and sulphite pulps all of which were in the form of sheets, had to be shredded. The shredding was done by hand by rubbing the pulp sheets on a vegetable grater. Care was taken to collect the fluffy fibrous material on a large clean sheet of cardboard.

VI—Drying the Cellulose

Heating at 100°-105°C for 8 hours was found to be a convenient method of drying cellulose to constant weight. In case the cellulose was moist and the bulk large, it was first dried for several hours in a small water oven at about 60°C, and then transferred to the electric oven.

The difficulty at first encountered in drying the Cross and Bevan alpha cellulose led to investigations of other methods of drying. A series of cellulose samples were dried in a vacuum dessicator over P_2O_5 and compared with a sample dried 8 hours at 104°C in the oven. The following list indicates the samples used and their state of dryness before beginning the experiment:

A—Cross and Bevan cellulose (air dry)

B—Alpha cellulose from unbleached cellulose by phenol ($CaCl_2$ dessicator dry)

C—Alpha cellulose from bleached sulphite pulp (dried at 80°)

D—Alpha cellulose from bleached sulphite pulp (dried at 80°)

All four samples were then dried at 85°C for 2.5 hours to bring them to as near a uniform moisture content as possible. Samples A, B and C were then placed in a vacuum dessicator over P_2O_5 and a vacuum maintained by an oil pump. Sample D was placed in the over at 104°C.

Sample D reached constant weight in 8 hours with a loss of 2.45 per cent moisture. Samples A, B and C, however, had not reached constant weight after 53 hours in vacuo. Samples A, B and C were then removed from the dessicator and placed in the oven at 105°C. At the end of 4 hours, there was a decided drop in weight in each case (loss of 0.11 to 0.18 per cent moisture). In the case of C, constant weight was reached, with a loss of 2.49 per cent moisture, which corresponds very closely with the oven dried sample D which lost 2.45 per cent moisture in 8 hours. The alpha cellulose by phenol proved much less hygroscopic than the alpha cellulose from the sulphite pulp. Under the same conditions the former retained 1.75 per cent moisture compared with 2.49 per cent for the latter. The crude Cross and Bevan cellulose retained 1.62 per cent.

Cellulose samples which were desired for critical examination, as for carbon and hydrogen determinations, were dried to constant weight in vacuo over P_2O_5 at a temperature of 78°C. Drying under these conditions gave assurance of no decomposition by heat.

The apparatus used (see accompanying illustrations) consisted of a tube 10" long and 1" outside diameter, which fitted to a second tube with a bulb shaped end, by means of a ground glass joint. The bulb was filled with a drying agent (P_2O_5), and the unit thus formed a special type of dessicator with the first tube as the drying chamber. A stopcock on the second tube enabled a vacuum to be maintained by means of an oil pump. The drying chamber could be kept at any constant temperature desired by the use of a special tube form of reflux attachment. This latter piece of apparatus is a double wall tube so constructed that the hot vapors from the liquid boiled in the flask beneath it were constantly around the inner tube. The drying chamber which is in this inner tube was thus kept at the temperature of the vapor.

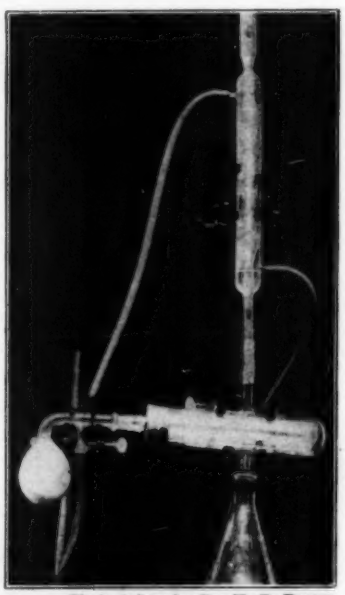


Photo taken by Dr. H. P. Brown

Detail photograph of apparatus used in drying cellulose over phosphoric anhydride

The cellulose samples for carbon and hydrogen determinations were placed in a boat and slipped into the drying chamber of the apparatus. A high vacuum was maintained by an oil pump, and a constant temperature of 78°C kept by boiling alcohol under the reflux. In this apparatus the optimum conditions for reaching constant weight with air dry material were to dry 5.5 to 6 hours in vacuo at a constant temperature of 78°C. If the sample is allowed to remain in the drying apparatus for more than one to two hours after the temperature has been lowered to room temperature detectable amounts of moisture will be absorbed from the P_2O_5. This is indicated by the following results:

	Weights of Cross and Bevan Cellulose
(a) Sample kept in vacuo at 78°C for 1 hour and then at 23°C for 17 hours.....	0.1912

(b) Same sample again maintained in vacuo at 78°C for 1 hour, and then at 23°C for 1 hour 0.1905

(c) Same sample again kept in vacuo at 78°C for 1 hour, and then at 23°C for 20 hours.. 0.1913

(d) Same sample again maintained in vacuo at 78°C for 1 hour, and then at 23°C for 2 hours 0.1904

water, 5 per cent acetic acid, and hot water for washing were used instead of 100 cubic centimeter portions. Three hundred and fifty to 400 cubic centimeters of hot water were used for washing. The cellulose was not treated with alcohol and ether. It was dried in the crucible at a temperature of 50-60°C for a varying length of time 2 to 16 hours, depending upon the wetness and bulk of the sample. After this preliminary drying, the crucible with the residue was placed in the electric oven at 100°C for 6 to 8 hours.

Table 6

Alpha, Beta and Gamma Cellulose Content of the Various Cellulose Preparations

Material	ALPHA CELLULOSE Test I	Test II	Test III	Mean	BETA CELLULOSE Test I	Test II	Mean	GAMMA CELLULOSE Test I	Test II	Mean
Cross and Bevan Cellulose, Batch I	74.70	72.63		73.66	9.33	6.85	8.09	15.97	20.52	18.24
Cross and Bevan Cellulose, Batch II	78.15			78.15	2.51		2.51	19.34		19.34
Cross and Bevan Cellulose, Batch III	79.19	77.32	78.22	78.24	3.06		3.06	17.75		17.75
Cross and Bevan Cellulose, Batch IV	78.00	78.21		78.10						
Mean for Cross and Bevan Cellulose				**77.04**			**4.55**			**18.44**
Cellulose by Phenol, unbleached	80.14	78.91		79.52	8.55		8.55	11.31		11.31
Bleached Cellulose by Phenol	78.50			78.50						
Bleached Soda Pulp	78.63			78.63	4.82		4.82	16.55		16.55
Unbleached Soda Pulp	90.74			90.74						
Bleached Sulphate Pulp	83.08			83.08						
Unbleached Sulphate Pulp	89.84			89.84						
Unbleached Sulphite Pulp, Batch I	86.44			86.44						
Bleached Sulphite Pulp, Batch I	84.63			84.63						
Bleached Sulphite Pulp, Batch II	84.57			84.57						
Average for both Batches Bleached Sulphite Pulp				84.60						

VII—Analysis of Cellulose

(A) Alpha, Beta and Gamma Cellulose—Alpha cellulose determinations were made on all samples of cellulose described above. Beta and gamma cellulose was determined in a few cases, but principally for the purpose of trying Opfermann's[5] modified procedure, as a simpler method than the original method of Schwalbe.[6] The amount of alkali resistant cellulose, however, was the principal objective in this part of the investigation.

The quantitative alpha cellulose determinations were carried out in the same manner as described for large batches with a few minor changes. The size of the samples used was approximately 1 to 2 grams with one exception in which a 10 gram sample was used. The same ratio of 17.5 per cent NaOH to cellulose was used in each case, namely 5 cubic centimeters to 1 gram of cellulose. The following changes in procedure were made: The digestion with alkali was carried out in an Erlenmeyer flask of 100 cubic centimeters' capacity instead of a 250 cubic centimeter flask. Care was taken to rinse out quantitatively all cellulose particles from the flask after the digestion. The material was filtered on a tared ignited Gooch crucible or a tared jena glass crucible with frittered glass bottom. The material was not removed from the crucible during the washings, but was loosened up with a glass rod. Fifty cubic centimeter portions of cold

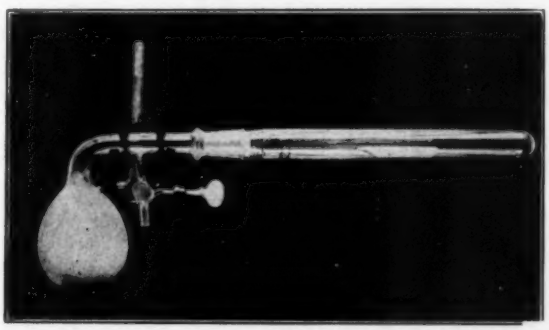


Photo taken by Dr. H. P. Brown

Spruce cellulose samples were dried in the vacuum dessicator over phosphoric anhydride shown in the photograph

[6] *Chemie der Cellulose* (1911) p. 637.

Beta and gamma cellulose in test Number 1, Table 6, were determined in the manner outlined by Schwalbe. The alkaline filtrates from the alpha cellulose determination were made acid with glacial acetic acid. The mixture was then heated to 100°C until the precipitate settled. An attempt was made to filter on an ignited Gooch crucible but the precipitate clogged the filter. It was thus necessary to centrifuge and decant the clear liquor. Great difficulty was encountered in getting the mother liquor clear even by centrifuging for long periods of time. The precipitate was centrifuged several times with rechanges of water, and finally washed with alcohol and weighed in the tared centrifuge bottle. Gamma cellulose was determined by difference between the weight of total cellulose and the weight alpha plus beta cellulose.

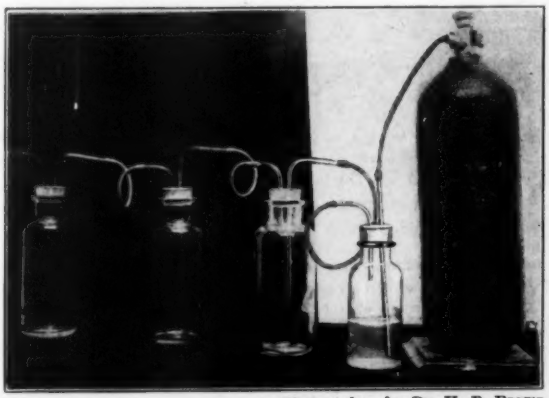


Photo taken by Dr. H. P. Brown

Apparatus used in preparing "Cross and Bevan Cellulose" by chlorination

The remainder of the beta and gamma cellulose determinations were determined by Opfermann's modified method. The alkaline filtrates from each alpha cellulose determination were diluted to 1000 cubic centimeters with water. After standing overnight the beta cellulose had settled out in each case and was quite readily filtered on a Gooch crucible.

Table 6 gives the results of the alpha, beta and gamma cellulose determinations.

(B) Furfural and Pentosans—The percentages of furfural and total pentosans were determined in all the prepared celluloses and alpha celluloses. Tollen's method, as outlined by Schorger[7] was used. Four samples were distilled at once in a battery of distilling flasks.

Pentosans and "methyl pentosans" were determined in a few cases, but the results were much less comparable than were the results calculated as furfural and total pentosans. This is in agreement with the results of Mahood and Cable[8]. The results of the furfural and pentosan determinations are given in Table 7.

(C) Lignin—Residual lignin was determined by a modification of Ost and Wilkening's procedure.[9] One to 3 gram samples of finely separated cellulose were placed in 800 cubic centimeter beakers. A volume of cold 72 per cent H_2SO_4 was added in the ratio of 10 cubic centimeters of acid to 1 gram of cellulose. Hydrolysis was allowed to proceed at room temperature for 5 hours. The acid was then diluted with 50 cubic centimeters of cold water followed by 300 cubic centimeters of boiling water. The residual lignin was collected on a tared Gooch crucible and weighed. The results are shown in Table 8.

In the case of the unbleached cellulose by phenol, a very distinct odor of phenol became evident when the H_2SO_4 was added. This would indicate that considerable of the condensation product of phenol and lignin remained in the crude cellulose.

Qualitative tests on alpha cellulose from Cross and Bevan cellulose, and alpha cellulose from bleached cellulose by phenol showed no traces of lignin. The cellulose solutions remained water white.

(D) Carbon and Hydrogen Determination—Several carbon and hydrogen determinations were made principally for the purpose of correlating the results obtained, with the purity of the cellulose as indicated by other methods of analysis. The percentages hydrogen and carbon closely approached the theory and close check results were obtained. Only in the case of unbleached cellulose by phenol was there an appreciable difference from the theory. This could be explained by the presence of 3.99 per cent lignin and phenolic compounds of lignin. The theoretical percentage of carbon and hydrogen in cellulose, ($C_6H_{10}O_5$), are 44.42 and 6.22 respectively.

Table 7

Furfural and Pentosan Determinations

Material	% Furfural Individual Tests	% Furfural Average	% "Total" Pentosans Individual Tests	% "Total" Pentosans Average
Cross and Bevan Cellulose, Batch I	3.62		6.19	
	3.63	3.62	6.21	6.20
Cross and Bevan Cellulose, Batch III	4.11		7.02	
	4.32	4.17	7.39	7.22
	4.25		7.27	
Cross and Bevan Cellulose, Batch IV	4.84		8.28	
	4.65	4.74	7.95	8.11
Total Average for Cross and Bevan Cellulose		4.17		7.17
Cellulose by Phenol, Unbleached	4.06		6.94	
	4.31	4.18	7.37	7.15
Bleached Cellulose by Phenol	4.01	4.01	6.76	6.76
Bleached Soda Pulp	4.07	4.07	6.99	6.99
Bleached Sulphate Pulp	5.27	5.27	8.99	8.99
Bleached Sulphite Pulp, Batch I	3.60	3.60	6.17	6.17
Bleached Sulphite Pulp, Batch II	3.25	3.25	5.56	5.56
Average for Bleached Sulphite Pulp		3.42		5.86
Alpha Cellulose (Cross and Bevan, Batch I)	0.76	0.76	1.31	1.31
Alpha Cellulose, Cross and Bevan, Batch II	0.99	0.99	1.72	1.72
Average for Cross and Bevan Alpha Cellulose		0.87		1.51
Alpha Cellulose from Unbleached Cellulose by Phenol	1.76		3.03	
	1.71	1.73	2.93	2.98
Alpha Cellulose from Bleached Cellulose by Phenol	1.73	1.73	2.97	2.97
Alpha Cellulose from Bleached Sulphate Pulp	1.90	1.90	3.30	3.30
Alpha Cellulose from Bleached Sulphite Pulp	1.26		2.16	
	1.29	1.27	2.23	2.19

Table 8

Residual Lignin in Crude Cellulose

Material	Percent Lignin
Cross and Bevan Cellulose	0.11
Cellulose by Phenol (Unbleached)	3.99
Cellulose by Phenol (Bleached)	0.40
Bleached Soda Pulp	0.38
Bleached Sulphate Pulp	0.06
Bleached Sulphite Pulp	0.42

The results given in Table 9 were calculated on the ash free basis.

The percentages of ash in the samples used, are the following:

Cross and Beven Cellulose 0.49%
Alpha Cellulose from Cross and Bevan Cellulose 0.17%
Cellulose by Phenol 0.19%
Alpha Cellulose from Cellulose by Phenol 0.12%

(E) Summary of Analyses on the Prepared Celluloses—Table 10 gives a complete summary of the analyses of the various prepared celluloses. Each figure is an average of all the individual determinations.

VIII—The Action of Alkali on Crude Cellulose

(A) The Solubility of Cellulose in Alkali of 12 vol. per cent and 17.5 per cent Strength—The work of D'Ans and Jager,[10] who found the maximum solubility of cellulose at about 12 vol. per cent, seemed so unusual that several check experiments were made. Analyses were made to ascertain whether or not more alkali resistant cellulose remained after the action of 12 vol. per cent (10.9 per cent by weight) NaOH than after treatment with 17.5 per cent NaOH. The same ratio of alkali was used in each case (5 cubic centimeters to 1 gram of cellulose), and the digestion carried out at 22°C. under hydrogen gas exactly as described for the determination of alpha cellulose. In every sample, more material was removed from the crude cellulose by the stronger alkali. The results are shown in Table 11.

A few beta and gamma cellulose determinations were also made in connection with the 12 vol. per cent NaOH resistant cellulose. There was a decrease in both the beta and gamma cellulose when the crude cellulose was digested with more dilute NaOH instead of the usual mercerizing strength alkali. Table 12 shows the results and their comparison with beta and gamma cellulose determined after digestion of crude cellulose with 17.5 per cent NaOH.

(B) Effect of Increasing Strengths of Alkali upon the Solubility and Pentosan Content of Crude Cellulose—Cross and Bevan cellulose samples were treated with alkali of 2 per cent, 5 per cent and 10.9 per cent strengths. The samples were treated in exactly the same manner as in the case of

[7] J. Ind. Eng. Chem., 9,556 (1917).
[8] *Ibid*, 14, 729 (1922).
[9] Chem. Ztg., 34, 461.
[10] *Loc. cit.*

Table 9

Results of Carbon and Hydrogen Determinations in Cellulose Preparations

Material	% Carbon	% Hydrogen	Error for Carbon by Difference from Theory	Error for Hydrogen by Difference from Theory
Theory for Cellulose ($C_6H_{10}O_5$)	44.42	6.22		
Cross and Bevan Cellulose	44.32	6.42	—0.10	+0.20
Cross and Bevan Cellulose	44.36	6.29	—0.06	+0.07
Alpha Cellulose from Cross and Bevan Cellulose	44.53	6.44	+0.11	+0.22
Alpha Cellulose from Cross and Bevan Cellulose	44.57	6.26	+0.15	+0 04
Bleached Cellulose by Phenol	44.42	6.25	0.00	+0.03
Alpha Cellulose from Bleached Cellulose by Phenol	44.61	6.29	+0.19	+0.07
Unbleached Cellulose by Phenol	**45.30**	6.30	**+0.88**	+0.08
Unbleached Cellulose by Phenol	**45.40**	6.25	**+0.98**	+0.03

Table 10

Complete Analysis of Analytical Data on the Prepared Celluloses

Material	% Alpha Cellulose	% Beta Cellulose	% Gamma Cellulose	% Furfural	% Total Pentosans	% Residual Lignin	% Carbon	% Hydrogen
Cross and Bevan Cellulose	77.04	4.55	18.44	4.17	7.17	0.11	44.34	6.35
Cellulose by Phenol, Unbleached	79.52	8.55	11.31	4.18	7.15	3.99	45.35	6.27
Cellulose by Phenol, Bleached	78.50	....	.....	4.01	6.76	0.40	44.42	6.25
Soda Pulp, Bleached	78.63	4.82	16.55	4.07	6.99	0.38	.....	....
Soda Pulp, Unbleached	90.74	....	.....	....	....	....	.....	....
Sulphate Pulp, Bleached	83.08	....	.....	5.27	8.99	0.06	.....	....
Sulphate Pulp, Unbleached	89.84	....	.....	....	....	....	.....	....
Sulphite Pulp, Bleached	84.60	....	.....	3.42	5.86	0.42	.....	....
Sulphite Pulp, Unbleached	86.40	....	.....	....	....	....	.....	....
Alpha Cellulose from Cross & Bevan Cellulose	.....	....	.....	0.87	1.51	0.00	44.55	6.35
Alpha Cellulose from Unbleached Cellulose by Phenol	.....	....	.....	1.73	2.98	....	.....	....
Alpha Cellulose from Bleached Cellulose by Phenol	.....	....	.....	1.73	2.97	0.00	44.61	6.29
Alpha Cellulose from Bleached Sulphate Pulp	.....	....	.....	1.90	3.90	....	.....	....
Alpha Cellulose from Bleached Sulphite Pulp	.....	....	.....	1.27	2.19	....	.....	....

Table 11

Percentage "Resistant Cellulose" after Treatment with 12 Vol. % NaOH and with 17.5% NaOH

Material	Treatment with 12 Vol. % NaOH	17.5% NaOH
Cross and Bevan Cellulose, Batch I	78.01	74.70
		72.63
Cross and Bevan Cellulose, Batch II	83.73	78.15
Cross and Bevan Cellulose, Batch III	82.78	79.19
		77.32
		78.22
Cross and Bevan Cellulose, Batch IV	81.89	78.00
		78.21
Cellulose by Phenol, Unbleached	84.00	80.14
		78.91
Soda Pulp, Bleached	83.41	78.63
Sulphite Pulp, Bleached	86.43	84.63
	86.62	84.57
Soda Pulp, Unbleached	90.96	90.74
Sulphite Pulp, Unbleached	87.82	86.44

Table 12

Percentage Beta and Gamma Cellulose Determined after Treatment with 12 Vol. % NaOH and with 17.5% NaOH

Material	Percent Beta Cellulose		Percent Gamma Cellulose	
	By 12 Vol. % NaOH	By 17.5% NaOH	By 12 Vol. % NaOH	By 17.5% NaOH
Cross and Bevan Cellulose, Batch I	6.41	6.85	16.58	20.52
Cellulose by Phenol, Unbleached	5.90	8.55	10.10	11.31
Soda Pulp, Bleached	3.45	4.82	13.14	16.55

the alpha cellulose determinations, and the same proportions of alkali solution were used (5 cubic centimeters to 1 gram of cellulose). The percentage of resistant cellulose decreased in each case.

Furfural and total pentosans were then determined on each of the resistant celluloses. The relation between the alkali, resistant cellulose and pentosans, together with the average figures from Tables 6 and 7 for cellulose treated with 17.5 per cent NaOH, are shown in Table 13. The results show that the pentosan content of the residual cellulose decreases with increasing strength of alkali.

Table 13

Relation Between NaOH, Resistant Cellulose and Pentosan Content of Residual Cellulose

Alkali Strength	0%	2%	5%	10.9%	17.5%
Percent Resistant Cellulose	....	95.82	91.19	82.78	77.04
% Furfural	4.17	3.50	2.21	1.15	0.87
% Total Pentosans	7.17	5.99	3.63	1.93	1.51

(C) The Effect of Retreatment of Alpha Cellulose with the Same Strength NaOH—Several samples of crude celluloses were given successive treatments with alkali, some with 12 vol. per cent NaOH, and the others with mercerizing strength NaOH. The purpose of this experiment was to determine whether or not retreated cellulose reaches a point at which it is no longer soluble in NaOH. All other tests were made under exactly the same conditions as those outlined for the determination of alpha cellulose. The results are shown in Table 14.

In the case of Test No. 7 (Table 14) the mass upon retreatment became a syrupy gel with a few larger particles. It was impossible to filter the material and centrifuging had to be resorted to. The thoroughly washed mass was quite jelly-like and has a slightly greenish color as of semi-trans-

parency. This anomalous result has not been explained.

The bleached phenol cellulose (Test 4) was retreated with 17.5 per cent NaOH a second time which again caused a considerable reduction in the per cent resistent cellulose. The smaller particles became so gelatinized that it was necessary to centrifuge the solution.

These two later samples of retreated alpha cellulose (numbers 7 and 4) were analyzed for furfural and total pentosans. The following are the results compared with furfural and total pentosans in the respective alpha celluloses:

	% Furfural	% Total Pentosans
Retreated (2d time) alpha cellulose from bleached cellulose by phenol	1.84	3.16
Alpha Cellulose from bleached cellulose by phenol	1.73	2.97
Retreated alpha cellulose from Cross and Bevan Cellulose	0.94	1.62
Alpha Cellulose from Cross and Bevan Cellulose	0.87	1.51

The results on the retreated alpha celluloses are therefore practically identical with those on alpha cellulose.

The percentage of "furfural" obtained from alpha cellulose cannot be reduced below a certain minimum by retreatment with alkali. This minimum approximates the minimum obtained with purified cotton cellulose. The so-called "furfural" obtained under these conditions may be hydroxymethylfurfural, due to degradation of the hexosans present.

The alpha cellulose preparation from Cross and Bevan cellulose often darken on drying at 100° C. This was probably due to very small amounts of material that could not be completely extracted with hot 95 per cent alcohol. This extraction entirely eliminates the difficulty.

X—Summary and Conclusions

1—The isolation of crude cellulose from red spruce (Picea rubens) was effected by five different methods. The most homogeneous preparation was apparently that obtained by bleaching sulphite pulp.

2—The purest and most homogeneous alpha cellulose preparation was that obtained from Cross and Bevan cellulose.

3—The methods of isolating "crude" and "alpha" cellulose were studied and described in detail. The source of the wood used was known and the material was chemically analyzed.

Table 14

The Effect of Retreatment of Alpha Cellulose with 17.5% NaOH and 12 (Vol.) % NaOH

Test No.	Material	Percentage Alkali Used	% Alpha or Resistant Cellulose	After Retreatment	
				% Loss of Alpha Cellulose	Final % Resistant Cellulose
X-111-A	Cross and Bevan Cellulose, Batch III	12 (Vol.)%	82.78	12.18	72.60
III-B	Cross and Bevan Cellulose, Batch III	17.5	79.19	6.99	73.65
IV-A	Cross and Bevan Cellulose, Batch IV	12 (Vol.)%	81.89	5.23	77.11
IV-B	Cross and Bevan Cellulose, Batch IV	17.5	78.00	11.74	68.99
P-III-A	Cellulose by Phenol, Unbleached	12 (Vol.)%	84.00	4.62	80.11
P-III-B	Cellulose by Phenol, Unbleached	17.5	80.14	4.60	76.45
I-A	Soda Pulp, Bleached	12 (Vol.)%	83.41	7.31	77.32
I-B	Soda Pulp, Bleached	17.5	78.63	7.72	72.55
7	Cross and Bevan Cellulose, Batch III	17.5	78.22	63.15	33.45
4	Cellulose by Phenol, Bleached	17.5	78.50	12.53	66.15

IX—Discussion

Judging from the analytical data on the various bleached celluloses described above, bleached sulphite pulp is perhaps the most homogeneous of the materials described. It contains more residual lignin (0.42 per cent) than did bleached sulphate pulp (0.06 per cent) and Cross and Bevan cellulose (0.11 per cent) but it contained far less furfural yielding material than did these other preparations and had a higher alpha cellulose content (84.6 per cent). This is in harmony with the findings of Mahood and Cable, that bleached sulphite pulp of all samples prepared by pulping processes, is most nearly comparable with cotton cellulose.

On the other hand, the alpha cellulose prepared from Cross and Bevan cellulose much more nearly approaches cotton cellulose, than does the alpha cellulose from bleached sulphite pulp. This is clearly indicated by the analytical data.

Only when appreciable amounts of non-polysaccharidic impurities are present (as in the case of unbleached cellulose by phenol) can any conclusions regarding purity be drawn from ultimate analysis (carbon and hydrogen determinations). Nearly all the preparations subjected to analysis closely approach the theoretical figures for pure cotton cellulose.

The hygroscopicity of alpha cellulose by the phenol process is less than that of alpha "sulphite cellulose" and is about the same as that of crude Cross and Bevan cellulose. Possibly this is explained by the slighter dispersion of the cellulose units during the less drastic isolation of the crude cellulose from wood by the phenolic method, than by either the sulphite or chlorination processes. This point may warrant further study. While the pentosan contents of Cross and Bevan crude cellulose and crude cellulose by phenol are practically identical, the corresponding alpha cellulose showed very marked differences in this respect. Cross and Bevan alpha cellulose is much lower in its pentosan content than is the phenol cellulose.

4—The analyses of the various cellulose preparations included the determination of alpha, beta and gamma cellulose, pentosans, residual lignin, and, in a number of cases, carbon and hydrogen. The latter had relatively little value in judging the homogeneity of cellulose preparations.

5—D'Ans and Jager's statement that cellulose is most soluble at 23°C in 12 (vol.) per cent NaOH was not substantiated.

6—The removal of pentosans from cellulose by alkali treatment was shown to increase with increasing strength of alkali. Upon retreatment with alkali the pentosan content of the cellulose reached an irreducible minimum.

7—It was impossible to obtain any alpha cellulose preparation in such a form that it remained completely insoluble in NaOH on retreatment with alkali. This confirms the findings of Tauss.[11]

8—Studies were made to determine the best methods of drying alpha cellulose preparations. Drying at 100°-105° C was ordinarily satisfactory. Air dried material could be completely dehydrated at 78° C in vacuo over P_2O_5. At lower temperatures, however, the cellulose absorbs moisture in such an evacuated system.

[11] J. Soc. Chem. Ind. (1890) 883.

The Foxboro Co., Foxboro, Mass. has established a branch office at 2104 Magnolia Building, Dallas, Texas. J. B. McMahon, district manager, will have as associates R. L. Mallory and C. L. Bryan. All problems involving the use of controlling recording and indicating instruments will receive prompt attention. The Dallas territory includes the states of Texas and Louisiana, and the Southern sections of New Mexico and Arkansas.

The Philadelphia Quartz Co., manufacturers of silicates of soda, have announced the removal of its Chicago offices to new and larger quarters in the Engineering Building, 205 West Wacker Drive.

Atmos Boiler Supplies Paper Mill

Swedish Paper Mill Operates with an Atmos Boiler at 1470 Lb. Pressure. High Pressure Found Satisfactory for Small Paper Mill. Description of Atmos Boiler

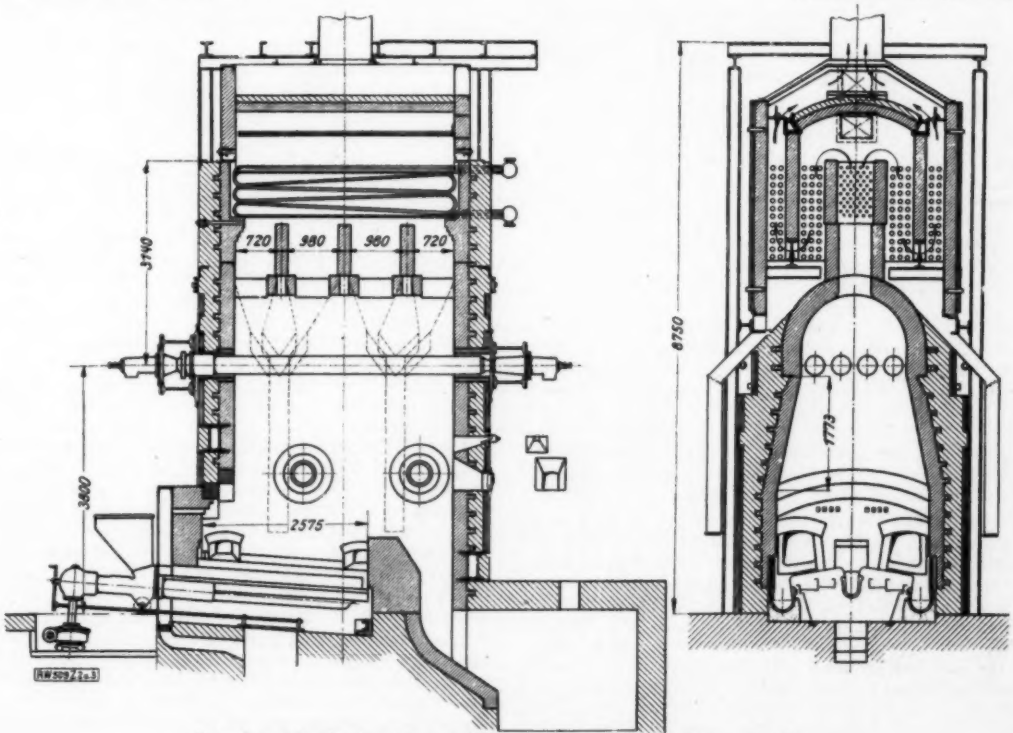
By JOHN H. D. BLANKE

THE Cellulose mill Fors Bruk Co., in Fors, Sweden, operates a steam plant at 1470 lb. pressure. This high pressure installation is noteworthy for several reasons: it is located in a lonely forest district about 112 miles north of Stockholm; installed in a comparatively small cellulose works having a production capacity of only 9,000 ton per year; has operated day and night since early in December, 1926, without trouble, and the boiler and turbine units need be attended only by one trained man.

This Atmos boiler generates 11,023 lbs. of steam per hour at 1470 lb. pressure and 824 degree Fahr. temperature. Of this steam, 1,764 lb. is generated in the preheaters. The superheated high-pressure steam is expanded to 88 lb. gauge back pressure by the use of a 480 kw. turbine generator built by the De Laval Steam Turbine Co., of Stockholm, and then enters at this pressure into the digesters of the cellulose works. The speed of the turbine is reduced from 15,000 to 3,000 r.p.m. at the generator by means of gearing. This turbine has two free-carrying wheels, so that the high pressure stuffing boxes are eliminated. For the present, the turbine has been arranged for a reduced output by the insertion of suitable guide collars ahead of the first runner.

Fig. 1—Atmos boiler in Fors Bruk Co. paper mill, Fors, Sweden

The paper mill uses just this high pressure plant to obtain its required steam and power. The Dano stoker, which is really an ordinary Erith underfeed stoker, but built in Denmark, assures good combustion. According to the report on the delivery test of the boiler, 80.4 per cent of the heat delivered in the fuel was passed on for use. In spite of the small water content of the boiler, the stoker adjusts itself exceptionally well to the considerable fluctuations in steam demand, so that the boiler pressure changes but little from its nominal value. Before the plant was built, the works secured its power from a central station and the steam for the digesters was generated in low-pressure boilers.



Figs. 2 and 3—Section through Atmos boiler in Fors Bruk Co., Sweden, with dimensions in millimeter (1 mm. is 0.03937 in.)

Josse states in the Archiv. fuer Waermewirtschaft und Dampfkesselwesen of Feb., 1928, pp. 46-47, that the savings effected by the use of this high-pressure back-pressure steam plant will pay for the installation in about two years.

The 1470 lb. boiler operates with four rotating tubes or rotors. The preheater and superheater are located above the circulating tubes. The raw water for the boiler feed is purified chemically and then distilled in an evaporator. The boiler is equipped, as mentioned above, with underfeed stokers of the Dano type, upon which Upper Silesian nut coal is burned. The clinker is removed automatically by means of two water-cooled spirals located to the right and to the left of the stoker. The combustion chamber is so designed that the solid layer of water heated to the boiling point. By this arrangement, a very efficient cooling of the tube is attained and the transmission of heat through the tube shell is accordingly increased to the maximum.

Fig. 1 shows a view of the Atmos boiler installed in the Fors Bruk paper mill. Figs. 2 and 3 show sections through this boiler with the dimensions given in millimeter. Fig. 4 shows a section through the De Laval steam turbine, and Fig. 5 shows the maximum (a) and the minimum (b) boiler pressure in October, 1927, in atmospheres of gauge pressure. Longitudinal and cross sections of two other or duplex Atmos steam generators designed for 1500 lb. operating pressure are shown in Fig. 6. Each of these boilers has a generating capacity of 16,500 lb. of steam per hr. and contains 8 tubes or rotors (R) of 12 in. outside diameter, ¾ in. wall thickness

Fig. 5—Maximum (a) and Minimum (b) boiler pressure in Fors Bruk Co. mill for several days in October, 1927, in atmospheres of gauge pressure (1 atu. is 14.7 lb.)

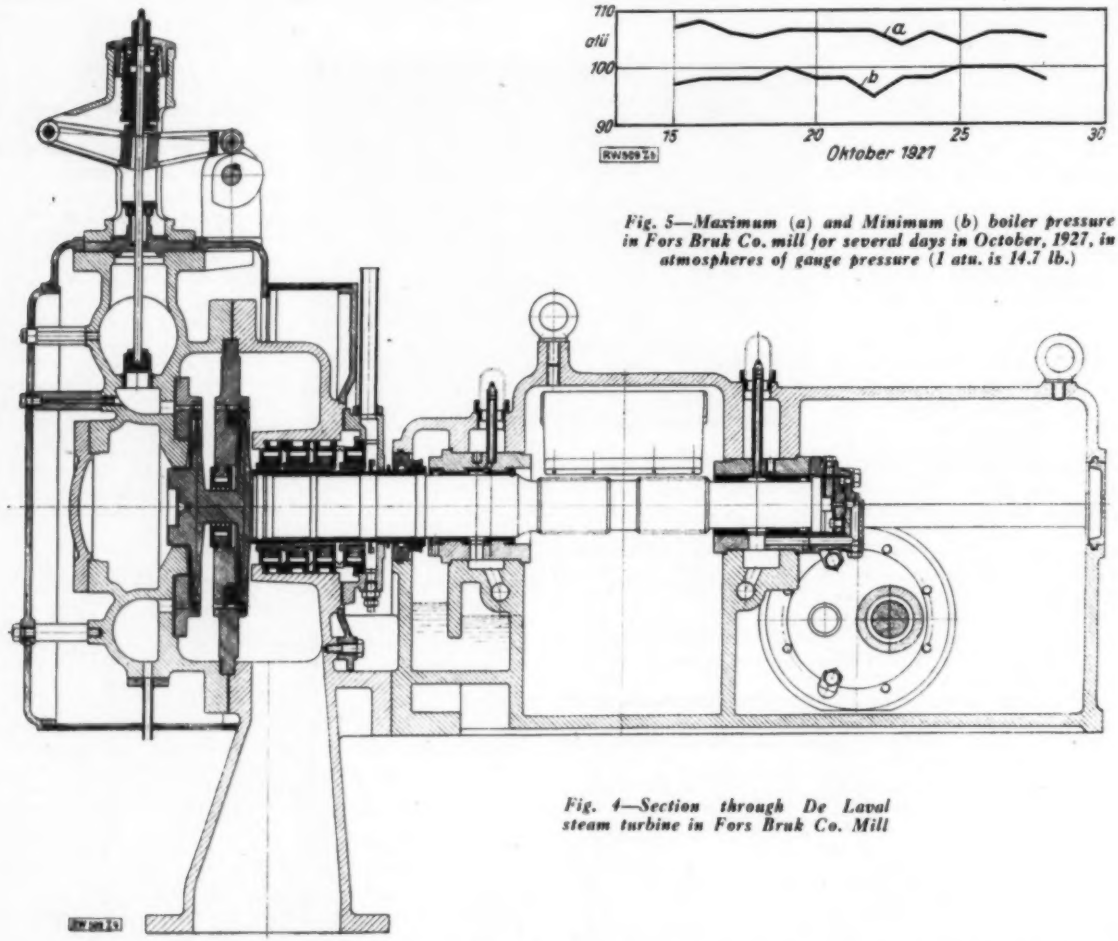


Fig. 4—Section through De Laval steam turbine in Fors Bruk Co. Mill

wood wastes which accumulate in the works can be fired along with the coal.

Principle of the Atmos Boiler

The success of the Atmos boiler operating in this small Swedish paper mill justifies a more detailed description of the principle of this high pressure boiler. The Atmos steam generator was developed and patented in all industrial countries by J. V. Blomquist, C. E., Stockholm, Sweden, and is built by the Aktiebolaget Atmos of that city. It is built up of a number of straight steel tubes having the maximum diameter that the working pressure will possibly permit. In order to remove the steam bubbles quickly from the tube shell, the tubes are rotated around their longitudinal axis. Thus the steam bubbles are easily separated from the water by the action of the centrifugal force and removed inwardly, leaving the interior surface of the tube completely covered with a and 11 ft. 2 in. tube length exposed to the flames of the furnace. These tubes are arranged in a horizontal row in the upper part of the furnace, their ends passing through the masonry of the furnace and furnished with headers shaped into bearing pins as shown in Fig. 7. One of these headers is welded to the tube; the other header is provided with flanges and attached to the tube by means of flange-bolts, which allows the header to be removed when the tube is to be inspected and cleaned.

The tubes are rotated at 333 r.p.m. by means of gearing driven by an electric motor or small steam turbine (E), Fig. 6. The bearing pins of the headers at the front end, where the gearing is arranged, are mounted in ball-bearings designed in such a manner as to prevent any longitudinal displacement of the tubes. Roller bearings are provided at the back end of the tubes, the outer rings of which are of extra

width. This allows the rollers to move longitudinally when the tubes expand and contract subject to changes in temperature. A mechanical stoker (S) of the Dano type is placed under the boiler furnace, but a stoker of any other design suiting the quality of the fuel can be used. After the flue gases have passed over the tubes (R), they are conducted down through the side flues (F), where the superheater tubes (D) and the feed water heater tubes (G) and (H) are arranged, so as to take up the heat remaining in the flue gases, before they pass to the smokestack.

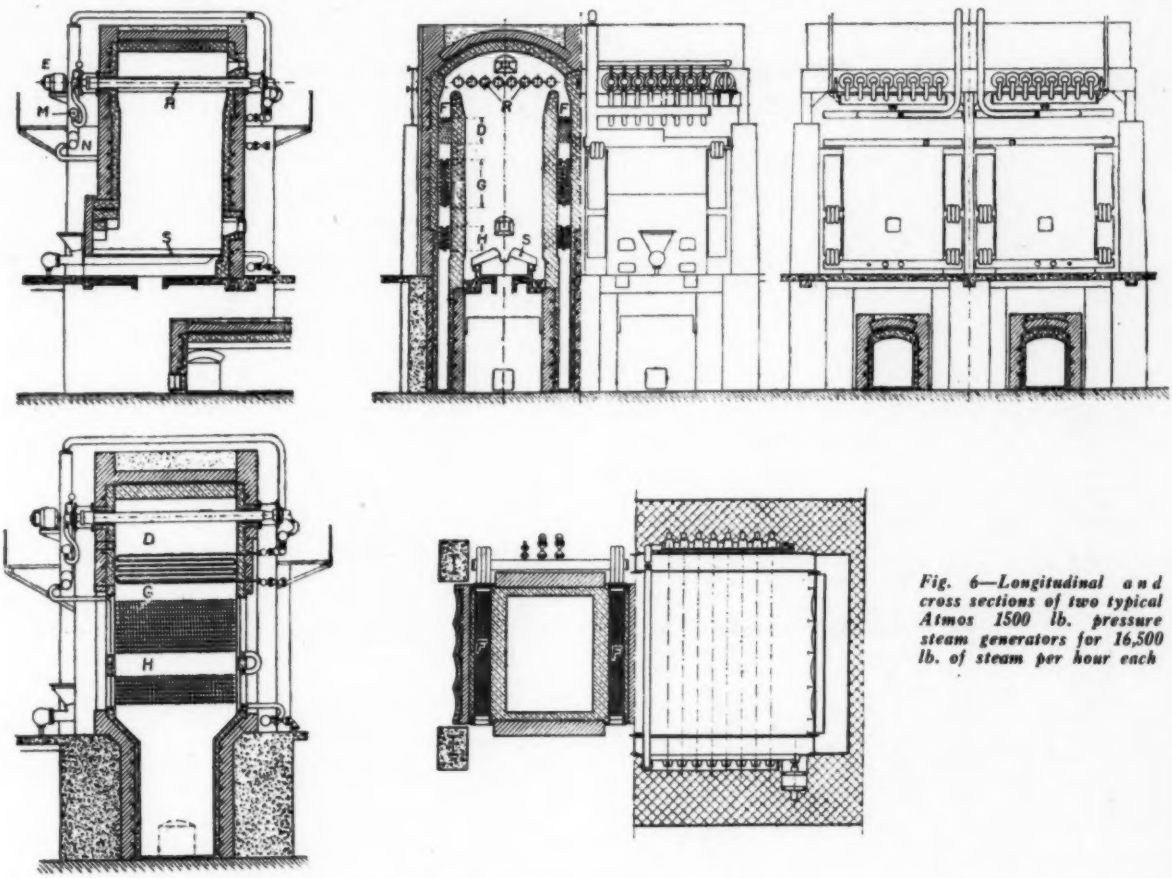


Fig. 6—Longitudinal and cross sections of two typical Atmos 1500 lb. pressure steam generators for 16,500 lb. of steam per hour each

A centrifugal pump supplies the feed water into the lower feed heater tubes (H) at about 140 lb. pressure. If the feed water needs to be purified to prevent scale formation in the boiler tubes, the feed heater is divided up into two sections (G) and (H), shown in Fig 6. After the water has been heated to about 320 degree Fahr. in the low pressure section (H), it is passed into a settling tank about 20 ft. in height and of such a large diameter as allows the feed water to pass upwards at a velocity of only 2½ to 5 inch per minute. The tank is installed at any convenient place in the boiler room and kept at 140 lb. pressure to prevent generation of steam in it. The mud and other impurities settle and are blown off occasionally. The purified water is pumped from the upper part of the settling tank into the high pressure section (G) of the feed heater at 1500 lb. pressure by means of a high pressure feed pump driven at a constant speed by a steam turbine or electric motor. The pump is equipped with an automatic return valve so a part of the feed water can be returned from the pressure side of the pump to its suction side when the high pressure boiler is operated below its normal output.

The water leaves the high pressure heater (G) at about 600 degree Fahr., which is about the boiling point at 1500 lb. pressure, and passes directly into the front end of the rotating boiler tubes (R). The steam is delivered from the back end of the rotors and passes through the superheater (D) into the main steam piping. When pure feed water is used as is the case when the surface condenser supplies it, the settling tank is eliminated and the feed heaters (G) and (H) are combined into one high pressure heater for raising the water temperature to 600 degree Fahr. in one step before it enters the boiler tubes. However, any suitable chemical water purifier may be installed.

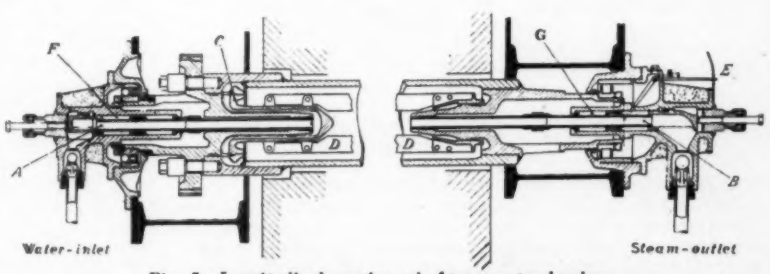


Fig. 7—Longitudinal section of Atmos rotor-headers

The feed heaters (G) and (H) are built up of gilled tubes, or steel pipes upon which the gills are wound in a spiral at welding heat by a patented process and then welded fast to the pipe. As the velocity of the flue gases when passing over

these feed heaters is about 2,000 feet per minute, practically no soot is deposited between the gills of the tubes. Renewable plugs can be provided in the connecting headers of the tubes for cleaning.

When the boiler tubes or rotors (R) rotate, the water spreads out over their interior surface, the thickness of the layer of water being automatically regulated between 1¼ to 2 in. according to the rate of evaporation. In order to compel the water to follow the motion of the tubes when the rotation is started, there are several longitudinal stringers (D) shown in Fig. 7, inserted in each tube. These stringers are fixed together in squirrel cage fashion and can be easily withdrawn when the tube is to be cleaned out. Impurities except scale collecting in the rotors can be blown off. To effect this, drain cocks are fitted to the feed water chests (M) and (N) in Fig. 6. When they are opened, the water in the tubes flows backwards past the disc (C), shown in Fig. 7, located at the water-inlet end of each tube. The water is thus entirely drained from the rotors while the tubes are being rotated but not fired.

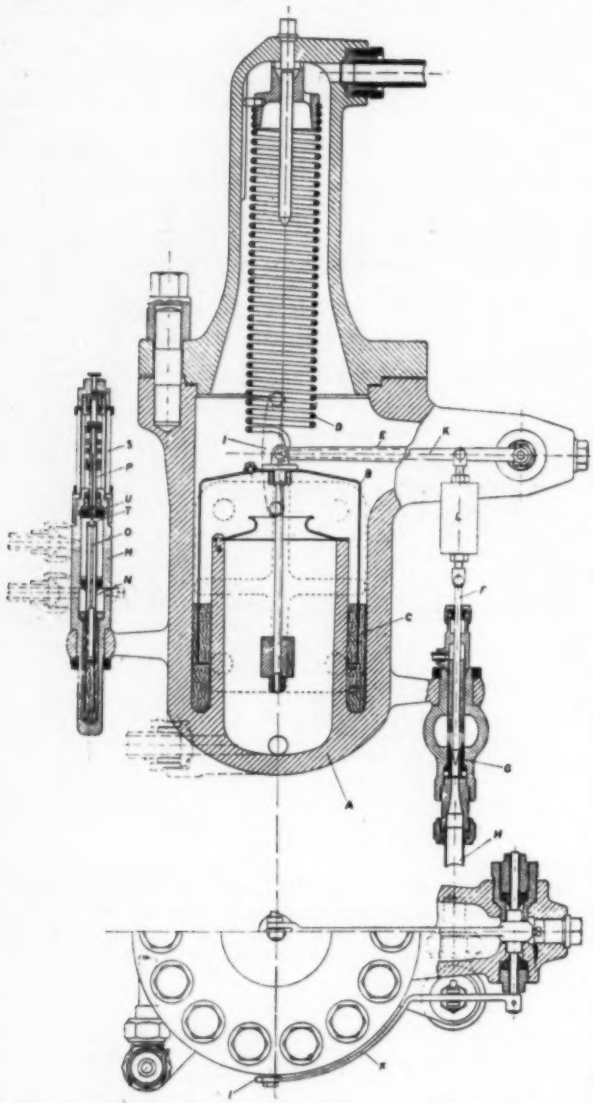


Fig. 8—Section of Atmos feed water regulator

To assure that feed water is supplied to the rotors if the temperature of the water in the high-pressure feed water heater ((G) in Fig. 6 should rise so far that steam is generated in the heater, the following arrangement is adapted. The feed water with the steam eventually accompanying it is allowed to flow through the feed water chests (M) and (N). The highest portions of these chests have pipe connections in the main steam pipe of the boiler. The steam passed into these chests is later passed past the boiler tubes directly into the main steam pipe, and only water is introduced into the rotors. Thus, the steam chests (M) and (N) serve as steam separators or water locks.

The stuffing boxes (F) and (G) of the rotors in Fig. 7 are packed with palmetto packing divided into two parts by means of a lantern-gland into which lubricating oil is introduced under a pressure of about 8 in. oil column above the steam pressure in the rotors. These stuffing boxes require very little oil. For example, in the Atmos boiler installed at the Carnegie sugar refinery at Gothenburg, Sweden, shown in Figs. 9 and 10, the oil consumption for 6 rotors, having 12 stuffing boxes, has mounted to only 1/10 gallon for a daily run of 10 hours. The packing very seldom required any tightening up or renewal. There was no leakage of steam and when inspected, the metal surfaces of the stuffing boxes were found to be polished bright as glass, showing that there had been very little friction.

A special arrangement is designed to regulate the thickness of the layer of water in the rotors as shown in Fig. 7. A round disc (C) is fixed in the water header (A) of each tube at a certain distance from the end of the tube, sufficient to allow the feed water to flow past the disc. This disc rotates with the tube. In order to compel the feed water to rotate also, there are radial vanes attached to that side of the disc where the water ends. When the tube rotates, these vanes set up at the center of the tube, that is in the feed water inlet, a suction, as do the vanes of a centrifugal pump. The disc (C) is a trifle larger in diameter than the interior diameter of the tube, the tube header being somewhat wider than the tube just where the disc is fixed in it. There exists thus also a difference of pressure between the water inlet and the steam outlet of the tubes or rotors.

The water inlet and steam outlet are connected by means of small pipes to the feed regulator shown in Fig. 8. The regulator consists of a cast steel chest (A) containing an inverted bell (B), the open end of which is submerged in mercury (C). The bell is suspended in its casing by means of a spiral spring (D) and connected to a lever mechanism (E). The interior of the bell is connected to the water end of the rotating boiler tubes, and the space outside the bells is connected to the steam end of these tubes. The spaces inside as well as outside of the bell are filled up with cold water.

The lever mechanism (E) is connected to the spindle (F) of a needle valve (G), arranged in the feed pipe which passes close to the regulator. This spindle can move up and down in the vertical sleeve of the valve with very little friction. As the rate of evaporation in the steam generator is varied, the spindle (F) opens or closes the valve (G), thus causing more or less of the feed water to be returned through the pipe (H) to the suction side of the feed pump worked at a constant speed by a steam turbine. Thus, the volume of water pumped into the tubes is adjusted to suit the evaporation of the boiler.

When the boiler evaporation is constant, the bell (B) in the feed water regulator is in equilibrium, and the needle valve (G) is kept open to a certain extent. Thus, a constant quantity of water is returned to the feed pump through the pipe (H), and with the feed pump running at a constant speed, feed water will be supplied to the boiler at a steady rate. If the rate of evaporation is increased, the layer of water inside the tubes becomes thinner. The difference of pressure at the water inlet and at the steam outlet of the tubes consequently increases and causes the bell (B) in the feed regulator to be pressed downwards, and the spiral spring (D) to be somewhat extended. The spindle (F) then closes up the opening in the needle valve (G), through which part of the water is being returned to the suction side of the feed pump. Thus, the amount of water supplied to the boiler tubes is increased. If the rate of evaporation is reduced, the action of the feed regulator is reversed.

The pressure available for moving the spindle (F) from open to closed position is computed to be 46 lb. Only one feed regulator is required for any number of tubes if proper cross section in the water inlets and steam outlets are pro-

vided, for then the satisfactory supply of water to all tubes simultaneously is assured. The pointer (K) connected to the bell (B) by means of the lever (E) indicates the thickness of the water layer on a graduated scale (I). The link connection between the needle valve spindle (F) and the lever (E) may be shortened or lengthened by turning the right and left threaded socket (L), at the same time serving as a counterweight. Thus, the thickness of the water layers in the boiler tubes may be modified as required.

A special water gauge designed on the same principles as the feed regulator is fitted alongside of the feed regulator in Fig. 8. It consists of a vertical socket (M) divided into two compartments, of which the lower one is partly filled with mercury and connected to the water inlets of the boiler tubes by means of small pipes. The upper compartment is connected to the steam outlets of the boiler tubes. A vertical tube (N) connecting these two compartments has its lower end beneath the surface of the mercury, thus cutting off direct communication between the two compartments of the socket (M).

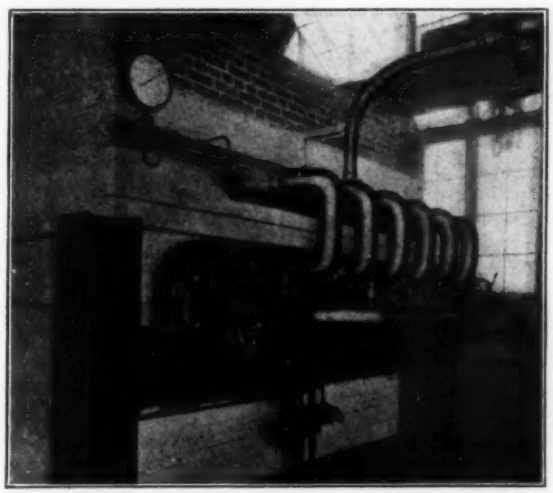


Fig. 9—Water end view of Atmos boiler in Fors Bruk Co. mill

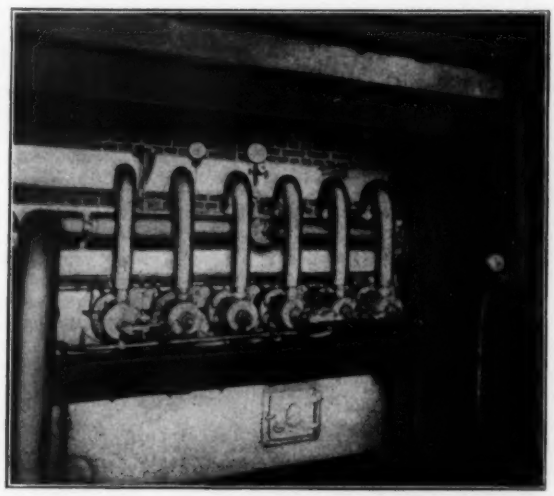


Fig. 10—Steam end view of Atmos boiler in Fors Bruk Co. mill

The pressure which acts on the mercury column inside of the tube (N) is equal to the pressure in the steam outlets of the boiler tubes, and the mercury outside of the tube (N) is subject to the same pressure as that which prevails in the water inlets of the boiler tubes. Consequently, the level of mercury in the tube (N) is pressed down a little below the level of mercury outside of the tube. The difference in length of these two mercury levels is dependent on the excess of pressure in the steam outlets of the boiler tubes over that in the water outlets, that is, dependent on the rate of evaporation in the boiler tubes. Since the thickness of the water layers in the boiler tubes is also dependent on the rate of evaporation, the level of mercury in the tube (N) of the water gauge indicates the thickness of the water layers in the boiler tubes in such a way that the mercury level rises when the water layers become thicker and descends when the water layers become thinner.

A slender rod of steel (O) is introduced into the tube (N) of the water gauge and floats in the mercury. The top end of this rod projects into the glass tube (P) and indicates on a graduated scale the position of the mercury level in the tube (N), that is, the thickness of water layers in the boiler tubes. The tube (P) is enclosed by an exterior glass tube (S), which prevents scattering of glass should glass tube (P) break under the high pressure. If tube (P) should burst, the steel rod (O) is thrust upward and its conical portion (T) obstructs the opening in the center of the plug (U), thus cutting off communication between the socket (M) and the glass tube (S), so that no high pressure steam can be blown out of the socket. But there is very little danger of the tube (P) bursting, as the entire space above the mercury in the socket (M) as well as the tube (P) are filled up with cold water.

An extension indicator (E) shown in Fig. 7 is also provided, being attached to the steam end of the tube with its short lever in contact with the tube. It indicates the extension of the tube due to any incrustation of scale inside the tube. Any scale would reduce heat transmission capacity of the tube, cause a rise in temperature in the tube shell and its expansion in length. It is thus a boiler scale indicator and expansion indicator combined.

The design of the Atmos boiler is therefore such that it can use steam pressures up to 1500 lb. per sq. in. and even more with safety. This steam generator is said to effect a considerable improvement of thermal efficiency and fuel economy, require less space and less weight for boiler plant, abolish the risks of explosions, and has the strain in the metal arising from steam pressure and high temperature completely controlled. The Atmos design meets this outstanding requirement, that the steam given off from the direct heating surface must be removed immediately as it is generated and replaced with water,—due to its special patented design. Thus, the coefficient of heat transmission is increased and an efficient cooling of the tube shell is obtained.

By increasing the steam pressure to 1500 lb., all the power required in a chemical wood pulp mill may easily be generated in by-pass and back-pressure turbines; all the steam required for the digesters and drying machines as well as for other heating purposes would be allowed to pass through them to transfer its excessive thermal energy into mechanical work. Thus, quite a considerable excess of power may be generated without using condensing turbines, where a great part of the heat energy in the steam is carried away in the circulating water. Under Swedish conditions, a market can in most cases be found in order to sell this cheaply generated surplus power.

Largest Manganese Steel Castings Ever Made

The American Manganese Steel Company recently shipped manganese steel castings in the form of ring gears, tires and heads for a 12′ x 14′ Paulson barking drum, made by Manitowoc Engineering Works, Manitowoc, Wis., to be used by a large Wisconsin paper mill.

The castings used were the largest one-piece manganese steel castings ever made, requiring a special deep bottom car, special rigging and special routing to make sure of bridge clearance enroute.

While the use of manganese steel in the paper industry is not new, as it has been applied in barking drums, beater bars, hog parts, conveyor chains, etc., it is interesting to note that the paper industry, not usually considered a large market for shock, wear and abrasion parts, should be the consumer of the largest manganese steel castings ever made.

Superintendents' Convention Program

Papers and Entertainments Provided for Ninth Annual Convention of Superintendents Association at Pittsfield, Mass., May 31, June 1 and June 2, 1928

PITTSFIELD ,Mass., will be the scene of the ninth annual convention of the American Pulp and Paper Mill Superintendents' Association beginning Thursday, May 31, and closing Saturday, June 2. The business sittings of the convention will be held at the Masonic Temple, where the members will be expected to register at 8 o'clock on Thursday morning.

Hotel Headquarters

Headquarters have been established at the Wendell Hotel, and the New American Hotel and Park Hotel will also be used, special rates having been obtained from these hotels for members and visitors. Superintendents and others who have not yet secured accommodations are advised to write without delay to John J. White, general chairman, 81 Suffolk Street, Holyoke, Mass., or to his son John J. White, Jr., who is secretary of the convention committee.

Attractions of the Convention City

Pittfield is the largest city in the Berkshire Hills, with a population of 48,000 and is a favored resort of tourists. Lying practically in the center of Berkshire County, it is not only the county seat but the metropolis as well. Besides being the home of one of the larger plants of the General Electric Company, it is within convenient reach of Dalton, one of the most important centers of fine paper manufacture in New England. Pittsfield boasts of a splendid country club and its Museum of Natural History and Art, the gift of the late Hon. Zenas Crane, is remarkable for its collection of paintings by old and modern masters, besides numerous exhibits of unusual interest, including the original one-horse shay about which Oliver Wendell Holmes wrote his famous poem. To the west of Pittsfield, on the main highway leading over Lebanon Mountain, is the West Pittsfield Shaker Settlement. A visit to this settlement forms one of the entertainment features provided for the ladies. Beautiful Lebanon Valley and many other points of historic and picturesque interest, including some of the many large estates for which the Berkshires are famous, will also be visited.

On the main road leading east from Pittsfield is Coltsville, where Crane & Co.'s mill for the manufacture of bank notes and currency paper is located, the town of Dalton, with the mills of Z. & W. M. Crane, Inc., Crane & Co., Inc., and Byron Weston Company lying further along this road. The first rag paper mill west of the Connecticut River was erected here in 1799 by Zenas Crane.

PROGRAM OF EVENTS

The detailed program of events is as follows:

May 31, 9:30 A. M.—Opening of convention at Masonic Temple by President Fred J. Rooney; invocation by Rev. Maurice A. Levy, pastor of First Baptist Church. Address of welcome by Hon. J. P. Barnes, Mayor of Pittsfield, and response. President's message and appointment of committees. It is planned to present the following papers at the forenoon sitting before adjournment for luncheon at 1 o'clock:

"How to Get Best Results from Slitters and Winders; Troubles and Suggested Remedies." L. J. List, Samuel M. Langston, Camden, N. J.

"Steam Plant Economics in Paper Mills." F. C. Farnsworth, Farnsworth Company, Conshohocken, Ohio.

"Adapability of Lift Truck, with Lantern Slides." Steubing-Cowan Company, Holyoke, Mass.

"Experiences of an Envelope Maker with Paper." James A. Shea, United States Envelope Company, Springfield, Mass.

"Improved Shaking Apparatus for Fourdrinier Machines." Beloit Iron Works, Beloit, Wis.

"Viewpoints of Paper Salesmen." G. K. Gibson, Wausau Sulphate Fiber Company, Mosinee, Wis.

Sectional Meetings—The afternoon of Thursday will be devoted to sectional meetings, of which descriptive circulars will be given out at the opening of the convention. In the evening there will be a joint banquet for the men and women of the party at which John J. White will be toastmaster, and John B. Kennedy, associate editor of Collier's Weekly, will be the principal speaker. Entertainment will be furnished by an orchestra and special entertainers, followed by dancing.

June 1, 10:00 A. M.—Opening of second day's sitting in the Masonic Temple, with the following program of papers:

"The Printers' Problems with Paper." Otto W. Fuhrmann, Blanchard Press, Inc., New York.

"A Demonstration of Vocational Education in the Mills." J. Norman Spawn, chairman; R. W. Jenkins, conductor.

(1) Report and outline on educational program; (2) Demonstration of a conference and its possible uses in a plant educational program; (3) Presentation of a paper plant training program.

"Automatic Control of Moisture in Paper." J. G. Callan and Albert Allen, Atlanic Precision Company, Boston, Mass.

"The Use of Corrosion-Resistant Steels in the Paper Industry." John A. Matthews, vice president, Crucible Steel Company of America.

"Adaptability of the Rod Mill for the Treatment of Fibers." W. A. Gocke, Shartle Bros. Machine Company, Middletown, Ohio.

Plant Visitations

Following luncheon there will be plant visitations in and around Pittsfield and the evening will be occupied with banquets for the men and women. At the men's banquet President Fred J. Rooney will be toastmaster and at the entertainment following the banquet, Peter Murray, singing humorist and character impersonator, will be heard, as well as several musical performers.

Separate Banquets

The ladies of the party are to have a banquet of their own at which Miss Helen U. Kiely, chief chemist, American Writing Paper Co., Holyoke, will be toastmaster, but they are invited to join the men in the banquet hall for the entertainment outlined above.

Final Sitting

June 2, 10:00 A. M.—The first business to be taken up at the morning sitting on Saturday will be a description of the Minton Vacuum Paper Machine Dryer, by the inventor, Ogden Minton, Minton Vacuum Dryer Corporation, Greenwich, Conn. This will be followed by a discussion of selected subjects suggested by members on many different problems and there will be addresses on power, safety and welfare by prominent engineers of the General Electric Company.

At the close of the sitting an election for officers will take place, followed by adjournment.

Among other things of special interest to members of the association will be the new laboratory of the E. D. Jones & Sons Company. A beating engine will be shown in actual operation so that visitors may see the working up of different stocks and get an idea of the performance of the beater.

Chemical Lime in Pulp and Paper Manufacture[1]

By W. D. MOUNT

THREE of the four recognized methods for producing pulp from wood are distinctly chemical processes. In two of these three processes, lime is a basic raw material since it is used in the preparation of the alkaline chemical solution by means of which the fibers are obtained from the wood. In the third process, as well as in one of the two already mentioned it is also used in the preparation of the bleaching agent. Hence it may be said that this cheap, and rather common material plays an important part in the manufacture of all classes of wood pulp except that known as mechanical pulp. The United States Department of Commerce reports that in 1926 the pulp and paper industry consumed 392,500 tons of lime valued at $3,547,700, or an average of about $9.51 per ton.

In the third volume of the series of textbooks on the manufacture of pulp and paper published under the auspices of the Joint Executive Committee representing the pulp and paper industry in the United States and Canada, Mr. A. B. Larchar, in discussing the amount of cooking liquor required in the soda process and the amount of lime used in the preparation of that liquor, makes the following statement:

> "From 900 to 1100 gallons, depending on the amount of moisture in the chips, of caustic liquor having a density of 16° to 19° Twaddle (say 11° to 13° Be.) is needed to cook a cord of wood. A mill making 100 tons of soda pulp per day will require from 140,000 to 180,000 gallons of liquor in 24 hours. Each cord of poplar wood requires 800 to 950 pounds of total soda, expressed as sodium carbonate, but used principally as sodium hydrate; this contains from 12 per cent to 25 per cent actual sodium hydrate, NaOH, on the weight of dry wood. Not far from 80 tons of soda ash, of which 82 per cent to 90 per cent is recovered from black ash, must go into the boiling tanks to make this liquor; 92 per cent of this will be changed to caustic, using for this purpose about 45 tons of lime."

On the basis of the statement quoted above, the average amount of liquor per ton of pulp is 1600 gallons, at 17½° Twaddle weighing 14,500 pounds, and carrying 1118 pounds NaOH, or 7.72 per cent by weight, assuming of course that the alkali in solution is all NaOH, or hydrate.

The paragraph quoted also gives the quantity of soda ash required as eight-tenths of a ton per ton of pulp and forty-five hundredths of a ton of lime with a conversion from carbonate to hydrate of 92 per cent.

Eight-tenths of a ton of soda ash or 1600 pounds will make 1197 pounds NaOH on the basis of 100 per cent conversion, and 1102 pounds NaOH on the basis of 92 per cent conversion.

The preparation of 1102 pounds of hydrate should require, theoretically, 771 pounds of lime (CaO) but the average amount used is stated as forty-five hundredths of a ton or 900 pounds; in other words, 116¾ per cent of theoretical. The excess lime, 129 pounds, may be charged to two factors, uncombined lime in the sludge and inferior quality.

Both of these factors are susceptible to exact chemical and technical control, with great improvement in efficiency and corresponding reduction in operating costs.

The excess lime, mentioned in a preceding paragraph, namely 129 pounds per ton, is at the rate of 6.45 tons per day for a 100 ton mill and at the average price prevailing in 1926 means a loss of $61.40 per day, or $19,034.00 per year of 310 days.

Of course these figures, based on theory and chemically pure raw materials, are not possible of attainment in practice, yet lime testing in excess of 96 per cent calcium oxide can be obtained, and with careful control of the causticizing operation, the free lime in the discarded sludge may be reduced to the vanishing point and need not be considered. Under these conditions, we should need to increase the amount of lime per ton of pulp in proportion to its actual available CaO, and instead of 771 pounds theoretical we would actually have to use 804 pounds which would effect a saving, as compared to Mr. Larchar's figures, of 96 pounds per ton of pulp equivalent to 4.8 tons per day and amounting to $14,150 in a year's operation.

Qualities Suitable for Causticizing and Bleaching

It might not be inappropriate for me to give you some of the characteristics of a lime that is suitable for causticizing and for bleaching.

High calcium oxide content is essential.

Quick and clear settling qualities are desirable, if not entirely necessary.

Impurities, such as silica and aluminum, aside from lowering the calcium oxide content, are undesirable, because of reaction with caustic forming silicates and aluminates, resulting in loss of alkali. The presence of magnesium oxide is most undesirable; it interferes with settling and filtering; an equivalent amount of good clean sand would cause less trouble.

Aside from the chemical composition of the lime and the impurities referred to, it is a matter of experience that a granular lime produced from burning coarse crystalline limestone has better qualities for causticizing and bleaching than a lime from stone of equally as good or better analysis, but of fine texture.

A typical analysis of lime successfully used for many years is as follows:

CaO	95.84 per cent
MgO	.64 per cent
Silica, iron, and alumina	3.52 per cent
	100.00 per cent

While the above analysis is not notably high in calcium and carries 3½ per cent of insoluble, nevertheless, the physical characteristics were such that the lime had the desirable quality of settling quickly and well, giving a very clear solution.

I have had personal experience with another lime which has exceptional qualities for causticizing and bleaching; this lime is of the following average analysis:

Calcium Oxide	97.20 per cent
Magnesium Oxide	.56 per cent
Silica	1.47 per cent
Iron	.31 per cent
Alumina	.40 per cent

In the case of this lime, its physical characteristics have an important bearing upon its behavior. It is said to be the best lime ever used at Niagara Falls for the production of bleaching powder, and in the causticizing process it leaves nothing to be desired.

The requirements for lime best suited to causticizing and bleaching may be summed up as follows:

(A) Physical: Lime should be burned from a granular, coarse grained, crystalline limestone.

(B) Chemical: The lime should test not less than 96 per cent calcium oxide, not in excess of 1 per cent magnesium oxide, nor more than 2 per cent insoluble.

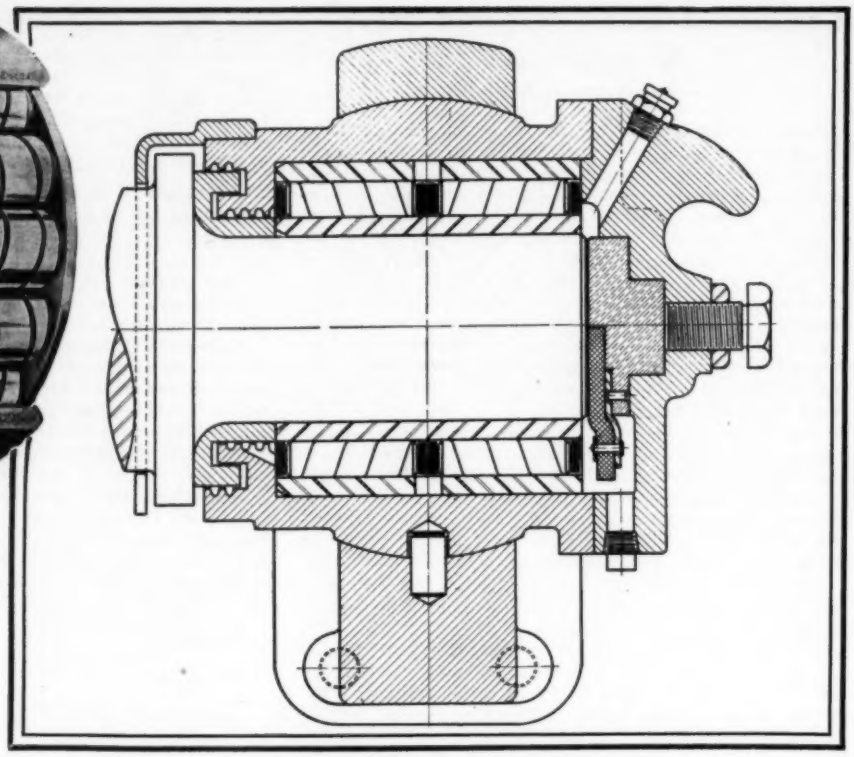
(C) General: The lime should be clean, free from core, cinders, clinker and other foreign matter.

Chemical Control in Lime Manufacture

About ten years ago, I prepared an article on the economical manufacture of lime. I prefaced my remarks with this statement:

> "The conversion of calcium carbonate to lime is a chemical process which may be carried on lacking entirely any chemical knowledge, and with but a moderate amount of technical skill. As the carbonate is decomposed at a red heat, it is apparently only necessary to apply the heat for a short period, and the result is lime, regardless of considerations of economy yet 'every step and every factor in the operation of lime burning has a definite significance, and the production of high-grade lime with high-grade economy is

[1]Presented at the meeting of the Southeastern Division of the American Pulp and Paper Mill Superintendents' Association, at Lynchburg, Va., March 16, 1928.



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as truly a technical process demanding skill and knowledge, as any other chemical manufacture. There is need of trained chemists and engineers in this industry to put it upon a distinctly scientific plane.'

"As every step and factor in the process has a definite bearing on the final outcome, the manufacture of lime must be under complete and constant chemical control. Therefore, it is not only necessary that such control be provided, but the design of the apparatus must be of a character that the control can be made effective; otherwise, it will be impossible to realize that continuity of operation and co-ordination of the various factors, so essential to uniformity in quality and quantity of output and the attainment of the highest efficiency and economy.

"It is doubtful if the salary paid a trained chemist could be invested to better advantage, or be more productive of desired results in any industry than in the manufacture of lime and lime products. However, as already indicated, it is not a problem for the chemist alone but his work must go hand in hand with that of the engineer. Chemical control cannot be effective in the highest degree unless the design of the plant be of a character to permit the regulation of all those factors having a direct bearing on the final result."

Some Experiences of Mills in the Use of Lime

The experience which I have had with lime in pulp and paper mill work during the past ten years has more than once verified the principles set forth in the statements just quoted.

In the course of my engineering practice I have had occasion to visit a number of pulp and paper mills in different sections of the United States and I have also visited mills in other countries. Wherever possible I have made it a point to investigate the lime consumption in these mills and the manner in which that lime was handled. It might be of interest to briefly describe some of the things that I have found in a few of these mills as illustrating the value of careful control over the use of lime.

In one of the oldest soda mills in this country I found that through inadequate control over the causticizing operation more lime was used than was necessary. The free or uncombined lime content of the calcium carbonate sludge resulting from the causticizing operation was at times averaging as high as 13 per cent, which means that out of every ton of lime dumped into the causticizing pans, 260 pounds were being thrown away each day, representing a loss of $1.24 per ton, assuming that the lime cost $9.51 per ton, the 1926 average price. In a hundred ton soda mill such a loss would amount to a total of $55.80 per day or to more than $17,000 per year.

In a well known sulphate mill in the South, I found that approximately 650 pounds of lime were being used to produce one ton of pulp, whereas in another mill nearby, using identically the same process, only 525 pounds of lime were being used. Investigation disclosed the fact that the lime used by the first mill was of poor quality, the principal trouble being that it ran at times very high in magnesium oxide. The management of this mill gladly accepted our offer to investigate the lime supply which we did. Our first step was to get the lime manufacturer to accept the dictum that the "burning of good lime always begins in the quarry." On this basis and at our recommendation a competent geological engineer and chemist was employed to make a careful survey of the quarries, with the final result that certain strata of the stone in the quarries were segregated and burned in kilns that were not charged with the general run of quarry stone as had been the case theretofore, and the quality of lime furnished our client was so improved that his consumption dropped from 650 pounds per ton of pulp to less than 500, with a resultant saving in cost of operation in excess of $25,000.00 a year. The use of better, and less lime, naturally resulted, as well, in a saving in salt cake. We also succeeded in convincing the manufacturer of the lime that it was really better from the standpoint of his own interest to sell less lime of better quality.

Quite recently I had occasion to visit a new sulphate mill which is being built in one of the southern states. I found that it was proposed to use, as a source of lime, stone from a nearby deposit. Investigation of this deposit and chemical analysis disclosed the fact that it was absolutely unsuited for the purpose, and when the attention of the resident manager was directed to the difficulties he would get into if he insisted upon using this material, he decided that low cost and accessibility were not the chief factors in selecting chemical lime, when its use is finally reflected in the cost sheets.

In another mill on the Pacific Coast, I found that almost any kind of lime was being used; some of it was good and some of it was bad. The purchasing agent did the buying and allowed price rather than quality to govern his actions. It is true that samples were taken occasionally from shipments of lime and analyzed, but the reports of these infrequent analyses more often than not reached the mill superintendent after the lime had been used. The best commentary on the results obtained in this mill can be found in the cost sheets of the pulp department.

In another mill located in the North, I found that regular analyses of the lime used for causticizing, with resultant improvement in quality from such control analyses, would result in a saving of $2,332 per month. A chemist was immediately employed, and a close watch is now kept on the lime and coal pile.

A number of other instances might be cited illustrative of the importance of close scrutiny of the lime being used. The Irish express agent's assumption, in connection with a consignment of guinea pigs, that "pigs is pigs" cannot be applied to lime. There are all kinds and conditions of this commodity. Some limes will do for pulp mill work, others will not. As a matter of fact, the supply of high grade, uniform quality, chemical lime is at present limited. I often wonder what would happen if the alkali used in mills was as poorly standardized as is the lime that is frequently bought.

What Is Expected of the Lime Manufacturer

The difficulties that pulp and paper mill superintendents have with lime are not always due to negligence on their part; it frequently happens that the lime manufacturer is attempting to produce a chemical product by rule of thumb methods in an antiquated plant that is unsuited for the purpose. My work has also taken me into a number of lime plants, and I feel that I can speak advisedly on this point. In many instances the lime manufacturer, who would be presumed to know the limitations of his product, knows nothing whatever about it, although he generally claims that his brand is as good as any. A manufacturer of this type places upon the consumer the burden of determining whether his lime is suited for a certain purpose, whereas he ought to know himself whether it can be satisfactorily used for that purpose.

I have attempted in a more or less sketchy fashion to point out some of the advantages of using good lime. Speaking from experience, I would say that pulp and paper mills should use the best lime they can get; while the purchase price may be a little higher than that of poor quality lime, lower operation costs and freedom from difficulties such as I have enumerated will more than offset any reasonable premium. I know of one southern sulphate mill which, after having tried a number of different kinds of lime, definitely standardized on one which costs them nearly $14.00 a ton; they have found that they can actually save money by paying this relatively high price.

The ideal source of supply for lime for pulp and paper mill usage is a plant operated under strict technical supervision where every step in manufacture, from the quarrying of the stone to the filling of orders, is checked and controlled by the chemical laboratory. The lime from such a plant will be dependable and of the same quality today that it was yesterday. The management of such a plant will be capable of co-operating intelligently with customers in the solving of problems involving the use of lime.

A change is taking place in the lime industry; there is

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a marked tendency toward fewer and better and larger plants. I believe that the day will soon come when the pulp and paper industry will be able to obtain the same kind of service from lime manufacturers that they now obtain from the manufacturers of alkali, chlorine, and other chemicals, a day when they can buy a standardized product deserving of the name **Chemical Lime.**

Michigan Safety Congress

Safety in Paper Mills Discussed at Meetings o Pulp and Paper Section

THE Michigan Safety Congress under the auspices of the Michigan Department of Labor and Industry and the National Safety Council, convened Thursday, April 12, and Friday, April 13, at Hotel Olds, Lansing, Michigan. The program was arranged to meet the needs of all of the various sections. The morning of the first day and the afternoon of the second day were given over largely to general meetings, whereas the afternoon of April 12 and the morning of April 13 were given over to sectional meetings—cement, food, health, metals, paper and pulp, public safety, public utilities, spray coating, women's public safety division and woodworking.

Dinner Meeting

The entire congress was well attended as was emphasized primarily at the informal banquet which was held on Thursday evening. The ballroom in which the banquet was served was completely filled with those people of the State of Michigan who manifested an interest in industrial safety.

The entertainment was furnished by the Lansing High School Orchestra, composed of about sixty young people who proved their ability as artists by their numerous renditions and the applause of the listeners. The director, as well as each of the young artists, is to be congratulated upon the splendid entertainment. The Elks Quartette also furnished some selections which were well received and numerous encores were given.

Clarence E. Benent, vice president and general manager of The Novo Engine Co., Lansing, Mich., introduced Clarence Carlton, secretary of the Motor Wheel Corporation of Lansing, who acted as toastmaster. Surely, some of Mr. Carlton's humorous stories will remain with the hearers for a long time.

Principles of Safety—How to Teach Them—Dr. Harry Myers, director of personnel, The Frigidaire Co., Dayton, Ohio, was the speaker of the evening. He spoke on the subject "Principles of Safety—How are we to teach them?"

In a most pleasing manner, Dr. Myers discussed his subject and emphasized the necessity of being clean and orderly, and of taking good care of property. Workers properly instructed in these principles of safety could never be careless, and carelessness is responsible for a considerable percentage of accidents. All workers should be careful and should be interested workmen, but to make for success in safety, it is essential that all employers are likewise familiar with the fundamental principles. Stress was laid on "order" and Dr. Myers defined order as—"A place is in order when there are no unnecessary things about, and things that are necessary are in their proper places."

To properly instruct the employes of any organization, it is necessary that the safety worker be a good teacher. A good teacher, according to Dr. Myers, must be definite and interesting. He also stated that individuals were often poor teachers because they were poor actors. However, to a greater or less extent, we are all teachers. John Patterson, so well-known in the history of the growth and prosperity of Dayton, Ohio, has said, "I go to school to every one I meet."

With safety instruction properly given, it is necessary to see that the instructions are carried out. It is necessary for a definite allocation of authority to accomplish this. Robert Ingersoll, it was said, when discussing Abraham Lincoln, made the statement that "Nothing discloses real character like the use of power."

With the safety director ascertaining the fundamental principles upon which to base his work, with these principles properly taught, and with the authority to put the ideas to work there should be no question about the success of the work. The great question becomes, "What are you going to do about it?"

All of those who had the privilege of listening to Dr. Myers' splendid address could not help but become enthused about the field for effort and the satisfaction in a job well done.

Paper and Pulp Sectional Meetings

Objectives of the Safety Movement—Charles Torrance, sperintendent of planning and personnel, Bryant Paper Co., Kalamazoo, Mich., served as chairman for the sectional meetings which were held Thursday afternoon and Friday morning. In his opening remarks, Mr. Torrance explained that the dominating objectives of the safety movement are:

1—The prevention of accidents;

2—The saving of life and limb of industrial workers;

3—The elimination of the suffering and hardship caused by accidents;

4—The lowering of industrial operating costs by reducing the frequency and severity of accidents.

Safety, or accident prevention, is no longer considered a fad or a luxury by those who have experienced the results of systematically applying its principles to their plants; instead it has been found to be a vital economic problem, the effective solution of which is an important factor in the success of any organization.

The program for the meetings of the paper and pulp section were arranged with the object of bringing out information that would be of value and help in successfully combating the accident evil which annually causes an immense amount of loss.

Mr. Torrance also extended a hearty welcome to those in attendance and expressed his appreciation to the chief executives who permitted or made it possible for their organizations to be represented. He also explained that it would be impossible for two of the speakers to be present at the congress. This necessitated some changes in the program as had previously been outlined for the meetings.

Organized Accident Prevention—E. C. Rutz, superintendent power and maintenance, Bryant Paper Co., Kalamazoo, Mich., was then introduced. He spoke on "Organized Accident Prevention Work in the Paper Mill and what it can do for You." He stated in part that organized prevention work in paper mills is recognized as a definite part of the manufacturing routine by all who have analyzed this outstanding cause of waste. Many incidental costs develop through accidents, and, according to literature issued by the National Safety Council, one large insurance company has shown that for every dollar paid out in compensation, four dollars go for lost time, labor turnover, wasted materials, etc.

Continuing his remarks, Mr. Rutz stated that from the origial study made at the Bryant Paper Co. plant, it was determined to make an organized effort in the reductions of accidents, and comparing the year of 1927 with 1926 they were able to realize a reduction of 14.85 per cent in the number of lost time accidents, and 78.25 per cent in days lost. Likewise, a comparison of accident cost for the same two years shows a reduction of 75 per cent in 1927 over that of 1926.

Definite information was given by Mr. Rutz as to methods of introducing safety work into the plant. Some of the common accidents which occur in the paper mill were also discussed. He also emphasized the importance of enforcing safety and housekeeping rules.

Discussion—The paper by Mr. Rutz was well received, and the discussion which followed its presentation was in the form of a round table. Every one present took part in the discussion and surely every one left the meeting with some new idea or thought to try upon return to the mill.

Methods of organizing a safety program in a plant were thoroughly discussed. Lekewise, opinions were given as to methods of instructing new men in the rudiments of safety. It was also brought out that the department foreman must be

TRAMP IRON

Costs paper mills thousands of dollars daily

BEATER plates give away, Jordan bars break and power consumption is increased when the tramp iron in paper raw stock is unchecked. Thousands of dollars tribute to tramp iron—money that Dings Magnetic Separation would easily save. One paper plant came to Dings when breaks became alarmingly frequent. The Dings ended the trouble, caught the iron—25 to 100 pounds a day. Power consumption was reduced 5 to 10 H. P.

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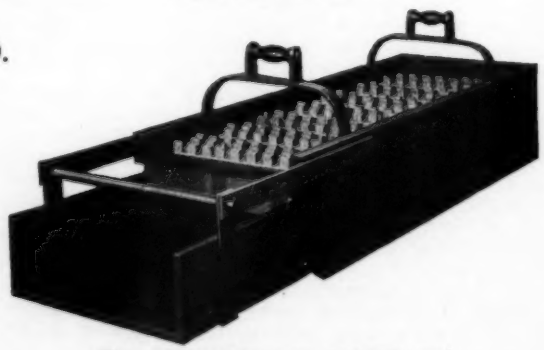


Wet type separator most commonly used. Bulletin 35-U tells the story.

PI-5-Gray

Branch Offices in Principal Cities

particularly alert during the hours of greatest fatigue of his working force. In one mill it was reported that accidents were heavy on Monday on both the day and night shifts. The reason given for accident frequency during the day was lack of necessary precaution in starting up equipment which had been down over the week-end. Likewise, workers had not settled down to the routine of their respective tasks. Lack of rest was given as the cause for many of the accidents occurring on Monday nights. Wednesday and Fridays were apparently days of high accident frequency as determined by the same analyzer.

Hot and cold weather bugaboos were considered and reasons given as to cause of many of the accidents during these two directly opposite seasons of the year.

Safety law enforcement was shown to be essential. Many accidents would be eliminated through proper supervision of the workers by the foremen and management.

The keynote of the entire discussion might be expressed in the simple thought—What is the cost of accidents in your plant per ton of finished product?

Paper Mill Hazards—At the Friday morning session, W. J. Graves of the Michigan Mutual Liability Company, Detroit, Mich., spoke on "The Hazards of the Paper Mill and How They may be Overcome." Many interesting points were brought out in this paper and emphasized by means of lantern slides.

Mr. Graves stated that Michigan was the fifth great paper-making state and that the industry withing the State employed about 12,500 workers. Throughout the entire discourse was emphasized the accident hazards common to pulp and paper mills and the relative importance of each.

Properly guarded machines were recommended to reduce the percentage of machine accidents. The adoption of modern methods and equipment for handling materials, it was stated, would reduce the hazards of handling materials. Likewise, Mr. Graves stressed the importance of the hazard—falls of persons. This hazard was reported as almost as serious a matter in the paper mill as in the building trades. A number of miscellaneous accidents were also mentioned.

Accidents in general, according to Mr. Graves, may be reduced in three ways—by removing the hazard, by guarding or protecting the man, and by supervision. It is a real job to prevent accidents, and Mr. Graves feels that the Paper Trade Associations should take a more active interest in the promotion of safety among its members. He cited the work of the Cement Manufacturers Association as an example of the work that a trade association has been able to do along these lines.

Following Mr. Graves' paper, a number of the accident hazards were analyzed in the form of a round table discussion by those in attendance as to cause and methods of prevention. It was suggested during the discussion that manufacturers of pulp and paper mill machinery should incorporate in the design of the equipment any safety devices that are deemed necessary. The paper manufacturer ought not be required to devise methods to guard equipment which has been manufactured outside his plant.

The meetings proved so interesting and helpful that it is regrettable more of the mills of the State were not represented. Perhaps next year with the enthusiasm developed at this meeting and with proper effort placed through all of the active workers in safety among the pulp and paper mills of the State will find a much greater number in attendance at the congress.

Registration

Bryant Paper Co.—Miss 'Montie Buckingham, E. C. Rutz, Chas. E. Torrance; Detroit Sulphite Pulp & Paper Co.—Ernst Gschwender; Kalamazoo Paper Co.—Mrs. M. Young; Kalamazoo Vegetable Parchment Co.—Wm. E. Walker; Michigan Mutual Liability Co.—W. J. Graves, John M. Masak, J. A. Purdy; Ocean Accident & Guarantee Corp., Ltd.,—R. W. Brown; THE PAPER INDUSTRY—Harry E. Weston.

The Du Pont Rayon Co., 132 Madison Ave., New York, plans the construction of a rayon factory at Ampthill, near Richmond, Va. The plant will cost $8,000,000 to $10,000,000, and have an annual capacity of 3,500,000 pounds.

McNary-Woodruff Bill Signed by President

A substantial increase in federal purchases of land for national forest purposes throughout the East, the Lake States, and the South is assured by the passage of the McNary-Woodruff bill which received President Coolidge's signature on May 1. As passed by Congress and approved by the President, the bill authorizes appropriations aggregating $8,000,000 to be expended for the purchase of national forest lands during the next three years. Of this sum, $2,000,000 becomes available on July 1, 1928; $3,000,000 on July 1, 1929; and $3,000,000 on July 1, 1930.

The measure is the outgrowth of legislation proposed three years ago by The American Forestry Association as essential to the up-building of a national forest system in the eastern United States. In a statement just issued, George D. Pratt, president of the Association, declared that passage of the bill is a signal victory for the national forest movement in the East and a gratifying recognition by Congress of the need of speeding up federal activities in order to meet the future forest needs of the country.

As sponsored by The American Forestry Association, and supported by industrial and conservation organizations throughout the country, the bill as originally introduced in both Houses provided for an expenditure of $40,000,000 over a period of ten years. The Senate passed the bill in substantially this form, but the House reduced the program to a two year term with an annual authorization of $2,000,000. The conferees appointed to compromise the differences of the two Houses agreed on the three year program, and while this may be disappointing to those that had hoped the bill would pass in its original form, the increased funds that will now become available will permit the Federal Government to enlarge very materially the national forest system in the eastern sections of the country. Passage of the bill is of particular moment to the people of Michigan, Wisconsin, and Minnesota and the pine and hardwood states of the South, because the increased funds now place the Federal Government in a position to extend its forest land purchases into those sections.

Passage of the bill is of likewise timely importance to the New England States because it makes it possible for the Federal Government to purchase the famous Waterville area of New Hampshire and add it to the White Mountain National Forest. The Government's option on this purchase expires June 1 and ability to purchase hinged upon Congress making a larger appropriation available. This the McNary-Woodruff bill accomplishes. The Waterville purchase will add 22,500 acres to the White Mountain National Forest, 800 acres of which contain one of the finest virgin stands of spruce left in New England.

During the last ten years, the Federal Government's work of forest acquisition in the East has been marked by uncertainty and indefiniteness because of meagre appropriations by Congress. It was in recognition of the need of a clear-cut fiscal program that would assure permanent and substantial progress in providing the Eastern States with a national forest system that the association urged and has been fighting for the passage of the McNary-Woodruff bill.

To Senator McNary and to Representative Woodruff who championed the bill in their respective Houses, the forest-loving public owes a large debt of gratitude for their constructive and successful leadership.

G. H. Collingwood Appointed Forester—The American Forestry Association has appointed G. H. Collingwood forester, to succeed Shirley W. Allen, who resigned to join the staff of the Forest School of the University of Michigan. Mr. Collingwood will take up his new duties June 1.

Manitowoc Engineering to Sell Moore Speed Crane

It is announced that the Moore Speed Crane will now be built and sold by the Manitowoc Engineering Works, an arrangement recently effected with the Moore Speed Crane Co., Chicago, who continue as sales representatives in Chicago for Manitowoc. The authorized sales agents for Manitowoc in New York City are Forsythe Brothers, 30 Church Street.

An extensive manufacturing program on the Moore Speed Crane is planned by the Manitowoc Engineering Works, which has large scale manufacturing facilities.

Look for This Mark
on Felts and Jackets

It means Quality and Service

Appleton Felts and Jackets are made from high grade pure wool with a plant control that checks every detail of operation during manufacture. The felts are produced right—to fully meet felt requirements of paper mills. And, that accounts for their wide use today in mills everywhere. Back of Appleton Felts and Jackets are 37 years experience in making felts.

Your felt requirements can be adequately met with Appleton Felts.

APPLETON WOOLEN MILLS

APPLETON, WISCONSIN

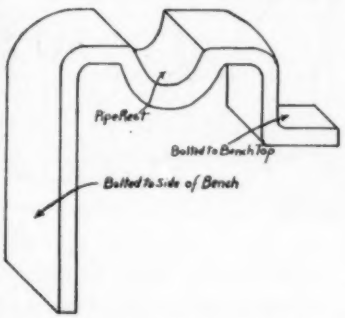
Appleton

Felts and Jackets

Practical Helps for the Mill Man

Handy Accessory to Pipe Fitter's Bench

A PIPE fitter's bench frequently has located near one end and to one side a pipe vise, but the bench is not always designed in such a way as to easily hold the pipe level when in the vise. One mechanic found it helpful to bend a piece of mild steel in the form as illustrated and to attach this arrangement to his work bench several feet behind the location of the vise. The strap steel used was ⅜"x1½" and was of sufficient length when bent to permit a pipe to rest on a level with the position it would take in the jaws of the vise. This pipe rest has been found very convenient by improving the working conditions upon the bench.

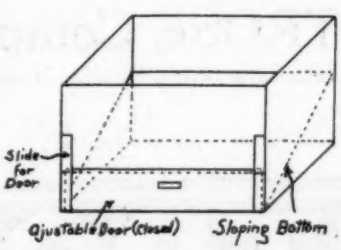


Storage Vats for Jordan Plugs

IN A LARGE board mill, where Jordan plugs must be changed frequently, the master mechanic has found it of advantage to have several plugs ready for immediate change. This plant makes use of three different types of Jordans and, to be in readiness for any emergency, one Jordan plug of each type is filled and stored ready for use. The wooden fillers are kept tight, and the plug is actually in position to operate as soon as installed in the shell by storing each of the three plugs in a concrete vat which is partially filled with water. The vat is located in one corner of the beater room in an area that had previously been little used. The vat is sufficiently large to easily contain the three plugs, and of a height that permits the plugs to be covered with water. Near one end of the vat is an opening similar to the opening in the bottom of a beater tub and equipped with a similar type of valve to permit emptying of the vat at any time. To the amount of time saved in placing a Jordan in operation in which it has been necessary to change the plug is the added advantage of having available plugs ready for operation to handle any emergency condition that might ever develop in the plant in so far as Jordan plugs are concerned.

Dry Alum Feeder Box for Beater

A BOARD mill superintendent, who was furnishing dry alum to the stock in the beater, found it convenient to design a box for this purpose. The box was located between the midfeather and the beater tub and a short distance behind the backfall. Such a box might be made of any convenient material, but should be sufficiently large to hold enough alum for a beater charge. The bottom of the box was sloped toward a sliding door which extended across the entire length of the box which was located lengthwise across the beater tub. The door being adjustable permitted the alum to be fed into the stock at any predetermined rate. This simple device has worked out very satisfactorily.



New Record Controller Developed by Bristol Co.

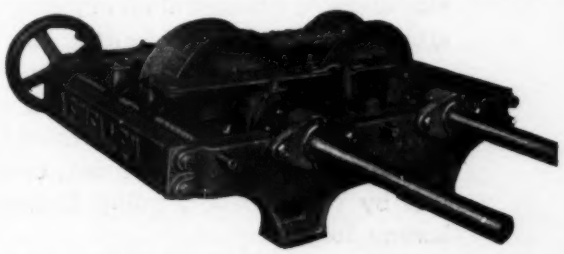
The Bristol Company, Waterbury, Conn., has recently developed a new recorder controller, which combines in one unit the recording instrument and the control instrument. This offers a more compact outfit than separate instruments.

This novel recorder controller is arranged for a contact capacity of 1,000 watts by equipping it with self-contained automatic switches. Terminals are supplied for making easy connections to line and control apparatus through conduit. Zero adjusters are provided for both recorder and controller pressure elements. The large current carrying capacity of this controller makes it possible to adapt the instrument to many control applications without the use of relays.

New Lewellen Transmission

The Lewellen Manufacturing Co., Columbus, Ind., announces that the Lewellen transmission is now furnished completely equipped with Timken tapered roller bearings throughout. The mounting for these bearings is designed to completely enclose each bearing.

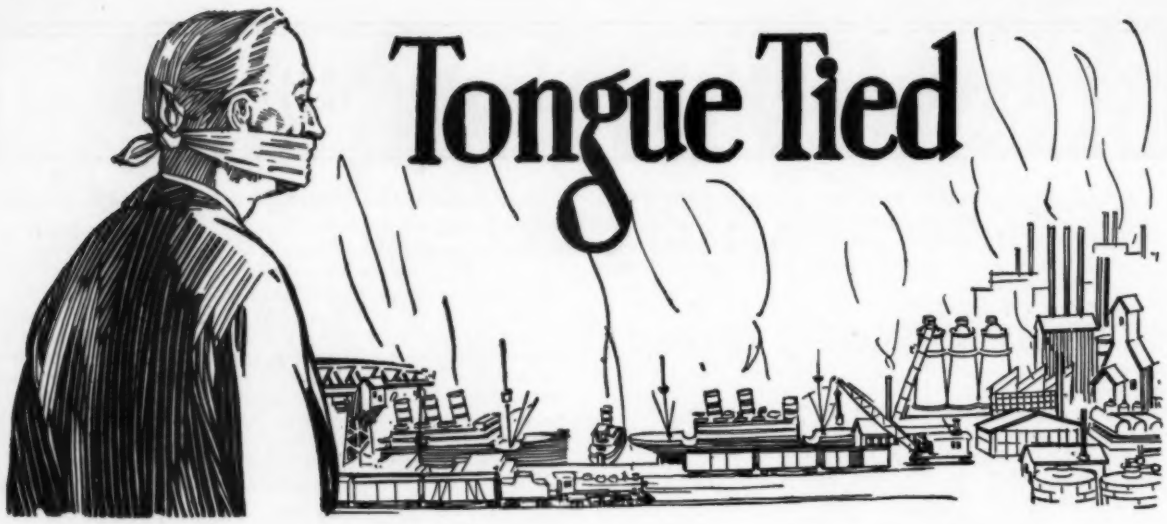
Lewellen Transmission is now furnished in the complete ball bearing design and complete Timken tapered roller bearing design, or it will be furnished in any combination; that is, with ring oiling shaft bearings; adapter type ball bearing shaft bearings; sleeve type ball bearing shaft bearings, or the Timken tapered roller bearing shaft bearings, and with any



of these shaft bearings, either the complete ball bearing thrust bearing of the Timken tapered roller thrust bearing. With this wide variety of bearing equipment, the Lewellen Transmission meets every condition in any industry which requires variable speed control. All of the transmissions mentioned are equipped with either the mechanical or electrical remote control, either manually operated or completely automatic.

Another improvement in the Lewellen transmission is the new belt with the unbreakable splice block. This new belt has the usual belt body with the leather tipped wood blocks attached, the improvement being in the splice block. The top plate of the splice block interlocks with steel bars on the two ends of the belt forming a splice stronger than any other part of the belt. The method of lubrication is another important improvement. The Alemite high presssure oiling system is now used on the discs, the oil grooves and channels being so designed that with one application the lubricant comes in contact with every part of the disc and shaft surfaces. This insures absolutely free movement of the discs on the shafts, and not only reduces the load on the bearings, but decreases the effort required to change the transmission from one speed to another.

The Warren Manufacturing Co., Milford, N. J., has recently placed an order for the second 72", 16 roll, glassine supercalender, together with a 147" dampening machine, with the Norwood Engineering Co., Florence, Mass. These machines are the largest to be built of this type.



Tongue Tied

There's an unwritten law in the engineering profession—a law that makes it unethical to put one's signature at the bottom of a letter of recommendation, even on a masterful product.

Hundreds of city and plant engineers, architects, superintendents, managers and purchasing agents know wonderful stories of the success of Nitrose—how this rust-resisting liquid armor spreads like paint; costs less by saving labor, going farther, lasting longer.

They know that corrosion cannot eat Nitrose; that it welds itself down into hot or cold bare metal, through water, oil and rust; that it dries hard and forms a film of protection against water, heat, rust, grease, gas, chemicals, acid fumes, brine solutions, salt, ammonia and alkalis.

That it is elastic, does not crack or peel. Needs no primer, thinner, sand blasting or extra material.

Personal experiences of these hundreds of men know these things are true. They tell us so by word of mouth, but professional ethics keeps them from putting these truthful facts on paper.

They would like to tell you the same thing about Nitrose.

What is corrosion doing to your equipment? Tell us in a letter. We can, without doubt, refer you to some one right in your own neighborhood who has met and conquered a profit stealing, plant wrecking, corrosive problem like yours.

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Shipment in cans or drums from Peoria, New York, Rochester, Cleveland, Detroit, Kansas City, Seattle, San Francisco, Los Angeles.

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O. M. Porter Issues Statement on A. P. P. A. Functions

Oliver M. Porter, secretary-treasurer of the American Paper and Pulp Association, has prepared for distribution to pulp and paper manufacturers generally a statement of what the association is and what it does, the text of which follows.

The American Paper and Pulp Association is a national association, representing the pulp and paper manufacturers and converters of the United States.

Its membership comprises approximately 80 per cent of the total tonnage of paper manufactured in the United States. Its function is to handle the industry's larger common problems, such as tariff, taxation, state and federal legislation, general statistics, raw material supplies, research, etc.

The Association enables the industry to do those things for its protection, promotion and perpetuation which would be impossible to individual mills or to small groups of mills working independently. It presents the industry's united front on its common major problems.

Its activities at present are largely focused on:

1. **Tariff**—Organizing the industry for tariff protection.
2. **Legislation**—Focusing the industry's support or opposition in legislative matters.
3. **Statistics**—Developing general statistical data for the entire paper industry and special statistical reports for various groups in the industry.
4. **Stream Pollution**—Studying the problem of waste utilization and stream improvement.
5. **Woodlands**—Developing its Woodlands Section's service to managers, foresters and executives charged with the responsibility of the industry's wood supply.
6. **Supply and Equipment**—Coordinating the interests of the supply and equipment manufacturers serving the paper industry in the knowledge that the industry's prosperity is their prosperity.
7. **Direct Service**—Giving effective, direct service to member mills, government departments, educational institutions and the public in response to their voluminous requests for information, statistical data, contracts, etc., particularly where such service is in the interest of the paper industry of the United States.

Affiliated with the American Paper and Pulp Association are the following associations representing the manufacturers of each of the several grades:

American Waxed Paper Association
Binders Board Manufacturers' Association
Bureau of Envelope Manufacturers' of America
Cardboard Manufacturers' Association
Cover Paper Manufacturers' Association
Glazed & Fancy Paper Manufacturers' Association
Gummed Industries' Association
Tissue Paper Manufacturers' Association
U. S. Pulp Producers' Association
Wrapping Paper Manufacturers' Service Bureau
Writing Paper Manufacturers' Association

In addition to these are the following service associations in the paper industry:

American Pulp and Paper Mill Superintendents' Association
Cost Association of the Paper Industry
Salesmen's Association of the Paper Industry
Technical Association of the Pulp and Paper Industry

Supplementing its regular statistical service to the industry and its member mills the Association prepares special statistical reports for the following groups:

Paper Bag Manufacturers' Association
Cardboard Manufacturers' Association
Binders Board Manufacturers' Association
Converting Paper Mills' Association
Glazed and Fancy Paper Manufacturers' Association
U. S. Pulp Producers' Association
Felt and Building Paper Manufacturers
Soda Pulp Manufacturers

The Association maintains effective direct contact with educational institutions, government departments and the leading executives and associations of the pulp and paper industry abroad. These contacts are such as to enable it to furnish its members with data and information regarding all aspects of their mill problems, from raw material supplies to distribution of their finished products.

The American Paper and Pulp Association is the backbone and the essential factor in the industry's organization structure in that it enables the industry to focus its power and influence for its own protection, promotion and perpetuation as could not be done by any organization less representative of the entire industry or any group of mills acting independently. As such, it merits the support of every pulp and paper manufacturer and converter in the United States.

Paper Salesmen Discuss Waxed Paper Sales Problems

Paul S. Hanway, secretary of the American Waxed Paper Association, led the discussion of the merchandizing problems of waxed paper, at the weekly luncheon of the New York Division of the Salesmen's Association of the Paper Industry held on Monday, April 23. This centered on the various service concessions which have been made by the manufacturers over a considerable period of years and the extent of the salesman's responsibility for these concessions. A point of particular importance was the question of the constant increase in the complexity of design and the number of colors and the amount of ink coverage required by the customer. In some cases, it was thought that the over-anxious salesman might be responsible for the increased demands of the customers, but in others the demand had apparently originated with the customer. It seemed to be the concensus that total sales of waxed paper have been increased because of State laws demanding better packaging of food products rather than by the printing and other concessions given by the manufacturers. The fact that many waxed paper salesmen do business on a commission basis was introduced and the question raised as to whether this perhaps influenced their attitude in offering service concessions to the customer.

It was generally agreed that keen competition between manufacturers had greatly stimulated the various production departments of the mills, for necessary economics in manufacture had enabled the manufacturer to give more for the same price than had formerly been possible.

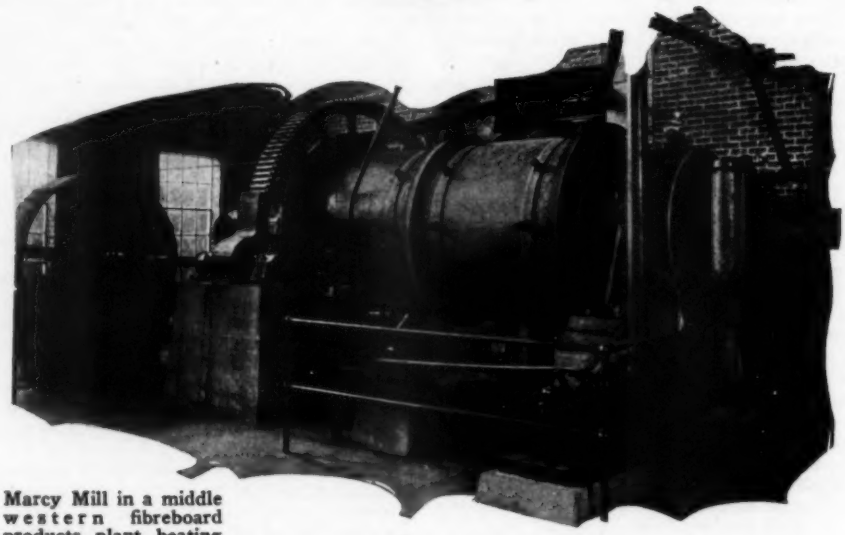
Before the waxed paper discussion, Dr. E. O. Merchant presented a comparative chart showing various Money Market Indexes from Jan. 1, 1924, to April 1, 1928, and discussed the fluctuations of money rates during that period and their effect on general business. He emphasized particularly the results of the action of the Federal Reserve Board in raising and lowering its rates from time to time to meet the needs of business and check speculation and stated that the most recent increases would probably lead to lowering of security prices and a deflation of brokers' loans, but that the new rates would work no hardship on legitimate commercial and industrial expansion.

To Make the Public Paper-Conscious

Frank E. Floyd, secretary of the National Paper Trade Association, discussed relations between merchants and manufacturers at a recent meeting of the New York division of the Salesmen's Association of the Paper Industry. It was pointed out by him that the N. P. T. A. had done much to bring about closer and more satisfactory relations with the mills. The paper merchants regarded themselves as a division of a large industry all of whose parts must operate harmoniously to be successful as a whole. Service and co-operation were still the essentials of successful business.

As an opportunity for co-operation between associations of manufacturers and associations of merchants, he suggested the need for an investigation and analysis of present and possible new uses of paper. He cited instances in his own experience where new uses for paper had been developed locally, thus pointing to the success of a national investigation properly financed and conducted.

Mr. Floyd suggested the organization of a joint committee on trade relations on which members of the salesmen's association and merchants' associations might serve. This idea received strong support from Major O. M. Porter, secretary



Marcy Mill in a middle western fibreboard products plant beating wheatstraw.

Step Up the Strength By Providing Better Fibers

ACTUAL operations—laboratory first, then commercial—have definitely shown that the Marcy *Open End* Rod Mill, used as a beater, increases the strength of the finished stock.

This is due to a number of reasons, chief of which is that the pulping action within the mill is not cutting but real beating. This in turn, is the result of operating on higher consistencies, an advantage obtainable only when working with a low pulp level.

It is the "open end", exclusive with the Marcy Mill, that provides this advantage. Our new bulletin gives all the details. Send for a copy.

Other Marcy advantages briefly stated:

Beating is Continuous
Works on Thicker Stock
Every Fiber Treated
Operations Quicker
Less wear on Rods and liners

The MINE and SMELTER SUPPLY COMPANY

Licensee under the Marcy Mill Patents and the Wells Patent for beating and refining pulp.

NEW YORK DENVER, COL.

Manufactured in Canada by William Hamilton Limited, Peterborough, Ontario

of the American Paper and Pulp Association, who stated that there was immediate need for a national survey of paper distribution such as has been made for other commodities. Along with this a comparative study of possible new uses for paper could and should be made. He advised starting a national advertising campaign on paper as a commodity, as in his opinion paper today does not enter very largely into the consciousness of the consuming public. It could be made to do so by an advertising campaign similar to those carried on by the lumber, paint and varnish and other associations.

Waste Paper Consumption

Waste paper comprises about 28 per cent of the raw materials consumed in the manufacture of paper, being second in importance to woodpulp, yet there are no reliable current statistics available as to the amount or value of the waste paper consumed by the paper industry in recent years.

J. A. Kavanagh, statistician, says that the American Paper and Pulp Association plans to take a census of the waste paper situation and will make a direct canvass of the book paper, binders' board and roofing felt mills. The Paperboard Industries Association is co-operating in the move and will supply figures for the total waste consumed by the paperboard industry.

All individual mill reports will be kept in strict confidence and only a grand total of the value and tonnage for the entire country will be published.

The American Paper and Pulp Association believes that the non-member mills realize the value of such figures and will willingly co-operate.

A New Forestry Laboratory

Announcement is made by Dean Franklin Moon of the New York State College of Forestry, Syracuse University, that a group of this year's senior class will receive instruction at the Pack Demonstration forest from April 28 to June 2, situated near Lake George in the heart of the finest pine region of the State.

This forest was given to the college about two years ago by the Charles Lathrop Pack Forestry Trust for the purpose of serving as a demonstration forest and research area combined. Being located on the main highway from Albany to Montreal, the roadside demonstrations in field reforestation and underplanting, thinnings to accelerate growth, pruning of young pines to improve the quality of the timber, can be observed by the thousands of tourists who pass this forest each year.

Wrought Iron Manufacturers Form Association

The specific organization of various industries has been an important factor in commercial progress. Unified publicity has brought large results, and concentration of effort has wiped out many obstacles too great for combat by individual companies.

A highly important and very interesting organization of industry was recently effected in Pittsburgh, Pa., when representatives of the leading manufacturers of wrought iron in various parts of the country met at the Duquesne Club and formed the Wrought Iron Research Association, the principal object of which is to gather and disseminate information about this time-honored and dependable metal. Officers were elected and an executive committee appointed. The headquarters of the association will be in Pittsburgh. Funds have already been provided for a publicity campaign which will be launched immediately.

The public has lacked knowledge of the characteristics of this material which make it admirably adaptable for uses where a high degree of resistance to corrosion and vibration, and high welding quality are desired. Modern metallurgy has failed to discover any satisfactory substitute for honest, old-fashioned wrought iron for many classes of service. The old and new world abounds with relics of this material which have defied corrosion for centuries. The public at large does not realize that it is possible today to purchase genuine wrought iron of exactly the same enduring quality as that made centuries ago, and that this iron is produced from the same raw materials and by the same processes as have been in use for more than one hundred and fifty years.

The second national meeting of the Fuels Division of the American Society of Mechanical Engineers will be held in Cleveland, Ohio, September 17 to 20, 1928. A comprehensive program is being planned, which will include papers by a distinguished group of nationally recognized authorities dealing with the production, distribution and efficient utilization of fuel.

Arthur D. Little Bulletin by Telephotograph

Scientific research is constantly resulting in new and startling developments. The value to business and industry in the present age of early release of such developments is inestimable. Among the educational mediums rendering valuable service along this line is the Industrial Bulletin published monthly by Arthur D. Little, Inc. The April issue of this bulletin, No. 16, is an innovation, bringing not only the story of the telephotograph, one of the newest contributions of science, but the bulletin itelf was transmitted as a telephotograph from New York to a Boton printer, being the first complete periodical telephotographed, from which an entire edition was printed and distributed.

Telegraphic transmission is now established as a permanent and incalculable aid to the commercial world, and the principle involved is a simple one. A 5x7 positive of the picture is made on a photographic film, which is mounted on a frame in the form of a horizontal cylinder which rotates one and one-half revolution per second and in each revolution moves along the direction of its axis one one-hundredth of an inch. A light beam is sent through the film onto the photoelectric cell at the center of the cylinder. The greater the intenity of the light falling on this cell the greater the intensity of the current which the cell permits to pass. Thus when solid black appears on the positive film no light falls on the cell, and the current flowing through the cell is very small; where the film is transparent more light falls on the cell and the amount of current which it passes is greater and in proportion to the intensity of the light which it receives. Thus in a spiral trace the light beam moves slowly over the surface of the film and produces a fluctuating current which varies in intensity with the light and shade of the original picture.

This electric current is amplified by means of the familiar vacuum amplifiers and passed through the telephone circuits to the various receiving points where it is again amplified, and is made to control a light valve. This is a magnetically operated shutter of great sensitiveness, controlling a beam of light. The beam plays upon a cylinder of the same diameter and revolving at the same speed as the cylinder at the transmitting end. On this cylinder is an unexposed photographic film which becomes the negative from which positive prints are made.

W. J. Serrill Elected Head of A. E. S. C.

The election of Wm. J. Serrill, assistant general manager of the United Gas Improvement Company of Philadelphia, to the chairmanship of the American Engineering Standards Committee is announced by the committee. Mr. Serrill succeeds C. E. Skinner of the Westinghouse Electric and Manufacturing Company who has been chairman of the Standards Committee for the past three years, during which the national standardization activities of the committee have doubled in volume.

Mr. Serrill has been prominent in standardization activities in the gas industry, and as representative of the American Gas Association he has been identified with the national standardization movement for several years.

The Rockford Paper Box Co., Rockford, Ill., has awarded contract for construction of a $200,000 addition to its plant to the Holm-Page Construction Co. The new building will be used for increased production of the company and as a warehouse for storage of raw materials.

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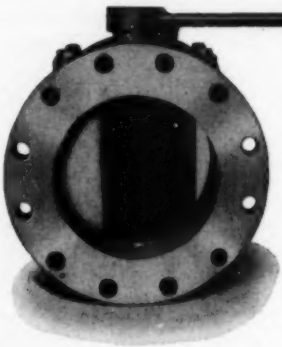

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The Month at Washington

CONGRESS is nearing the fag-end of its journey and hopes to adjourn in the month of June. Legislation is being rushed through and in general there are great signs of activities and hustle and bustle under the dome of the Capitol. However, but little legislation of importance to business has as yet reached the final stages. Much unimportant legislation from a business standpoint has been passed. Hearings have been held on a bill introduced by Congressman E. E. Brown of Wisconsin (H. R. 8561, and H. R. 5484) to provide for the conduct of scientific investigations by the Forest Service to discover economically practical methods of the disposal of the waste materials of pulp and paper mills without polluting streams, but no definite action has been taken by the Committee on Agriculture.

The bill (H. R. 8927) to authorize combinations against monopolies abroad by forming large importing corporations in this country was defeated in the House by a vote of 181 to 120. The Newton bill sought to legalize organized opposition to foreign price control of raw materials, amending the Webb-Pomerene Act so as to permit American combinations without violating the anti-trust laws, for the importation of essential raw materials. The bill was designed solely to give American manufacturers the opportunity to cope with foreign raw material monopolies, either governmentally controlled or directed. The bill was defeated in behalf of the small manufacturers and on the ground that it would tend to artificially enhance prices by these import combinations as well as create the opportunity for absolute monopoly and control of raw materials purchased by these giant import combinations.

The Senate has passed a bill (S. 2475) to create a prosperity reserve and to stabilize industry and employment, by the expansion of public works during periods of unemployment and industrial depression.

"Industrial depressions seem to come and go in cycles," said the Senate Committee on Commerce in making a favorable report on the bill. "Why, we may not exactly know. Their prevention is most desirable and any action that will retard or prevent their recurrence will be beneficial to everybody and to every industry. One of the greatest evils from these depressions is unemployment. Any measure that lessens employment strikes at the most vital phase of these cycles. There are many governmental activities that employ labor. If they can be so directed as to furnish increased employment conditions in the country when an industrial depression is threatened or is under way, the result must be good. This is what we seek to do by this legislation."

Postal legislation reducing postal rates although passing both houses is likely to be vetoed by the President because of the reduction in the revenues of $38,550,000. This too greatly reduces the already large deficit in the annual revenues of the Post Office Deparment. This might leave the department without funds to meet its expenses. The congressional solons hoped to withold the pending legislation and that there would be no postal rate reduction legislation enacted by this Congress but the Senate whip was ineffectual. (H. R. 12030).

The Senate Committee on Forest Research reported favorably on a bill (S. 3556) to insure adequate supplies of timber and other forest products for the people of the U. S., to promote the full use of timber growing and for other purposes. This legislation provides for a comprehensive forest research program.

The Senate passed the bill (S. 726) to instruct district courts of the United States to decide every matter submitted in a cause, whether interlocutory or final, within 5 months. This will have the effect of stimulating quicker decisions in the federal courts and to do away with the growing practice of legal delays sometimes extending over a long period of years before a final decision is reached by the appellate courts finally determining a law-suit.

Senator Wagner introduced a bill in the Senate to provide for the establishment of a national employment system and for co-operation with the States in the promotion of such system and to regulate the expenditure of moneys that shall be appropriated for such purposes. The bill was referred to the Committee on Education and Labor.

The Senate has passed a bill (S. 1710) to authorize the establishment of a national hydraulic laboratory in the Bureau of Standards and for the construction of a building therefor, for the determination of fundamental data useful in hydraulic research and engineering.

Witnesses appearing before the Senate Committee on Post Offices discussed the bill (S. 1752) introduced by Senator Oddie to regulate the manufacture and sale of stamped envelopes. The bill provides that after Dec. 31st next the government shall not manufacture for sale or sell any stamped envelopes with any lithographing, engraving, printing or advertisement upon them.

The House has finally passed the Trade Mark Bill (H. R. 13109), which incorporates into one act all the various trade mark acts enacted in the past, thus overcoming various inconsistencies in various laws and removing defects developed in their operation from time to time. Another feature of the bill is the registration of marks which have acquired a secondary meaning in distinguishing goods. Section 3 of the act carries out treaty obligations with reference to international trade marks. Section 4 provides for speedy registration of marks used upon merchandise exported from the U. S. to prevent piracy in those countries. Section 5 gives a complete file of all existing trade marks so that they may be used for quick search purposes.

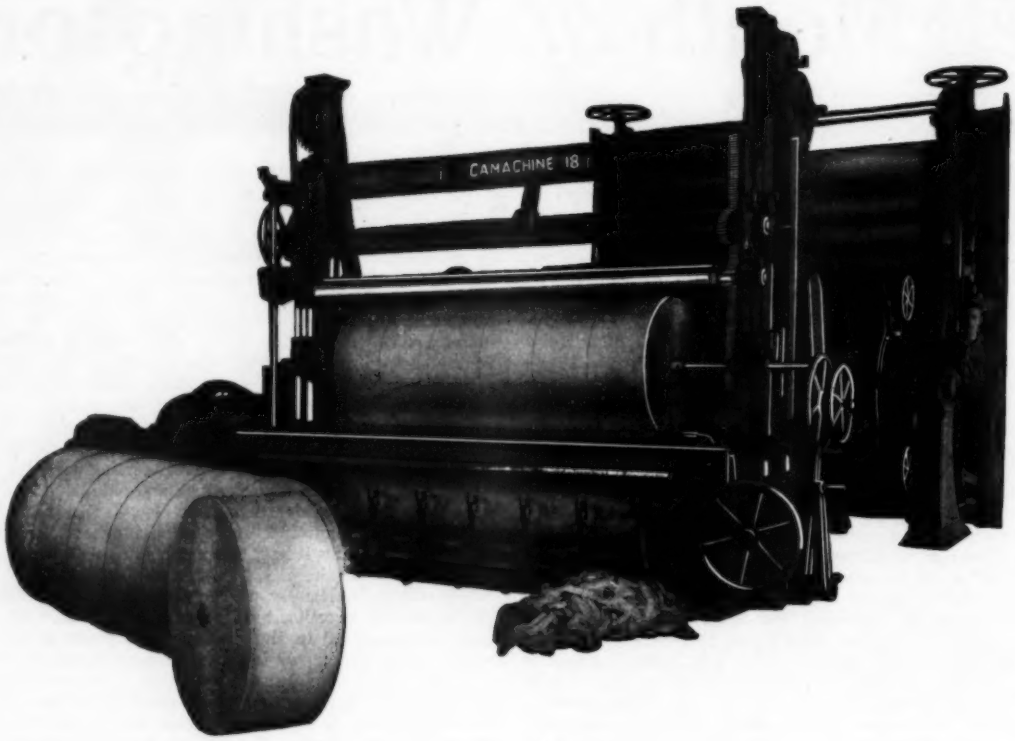
Canada Reduces Sales Tax on Advertising—Reduction in sales tax on advertising matter and changes in regulations concerning indications of country of origin on printing matter have been provided by the Canadian Postal Administration in a ruling just announced. The sales tax has been reduced to 3 per cent and blind-embossed or die-stamped indications of the country of origin on printed or lithographed matter imported into Canada will not be accepted as satisfactory compliance with the Canadian provisions for the marking of imported goods.

U. S. Chamber of Commerce Meets—The annual meeting of the U. S. Chamber of Commerce was held in Washington May 7-11, with a record breaking attendance. More than a score of business subjects were discussed, including commercial arbitration, commercial aviation, foreign trade, the Federal Trade Commission, maintenance of resale prices, railroad rates, taxation, trust legislation, water power, etc.

Recent Publications—"Health and Recreation Activities in Manufacturing Industries" is the title of a bulletin just issued by the U. S. Bureau of Labor Statistics (No. 458).

"Trade Practice Conferences", March 15, 1928, is the title of a pamphlet just issued by the Federal Trade Commission, showing the usual procedure and practices during a conference.

Studying Paper Durability—An extensive research relative to the durability and other properties of paper has just been started by the Bureau of Standards. The investigation, among other purposes, is designed to ascertain the effect of accelerated aging tests upon different kinds of paper. The degree of permanence of paper is considered a matter of vital importance. Little is known definitely about the permanence of modern papers. The bureau has made some research on the subject already, and from records of the aging of papers, it appears that wood fibre papers in general have



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given poor service in respect to permanence. The question is of particular importance to state and federal governments and public libraries and book publishers using book printing paper. Rag fibre paper in general have proved suitable for such permanent records, but the fact that a paper is made entirely of rag fibre does not in itself ensure permanence. The materials entering into the paper must be chosen with care so that no materials will be present which are in themselves unpermanent or which will induce deterioration of the paper. It is quite well established that for fibres in themselves to be permanent, they must be reduced to as pure a form of cellulose as possible. The purity of the fibres is commonly measured by determining the copper number. As rosin sizing induces decomposition of paper fibres, it should not be used. Judging from past records and from aging tests, the sizing should consist of glue only as when properly applied such sizing is very permanent, and has no injurious effect upon the paper fibre. Starch sizing appears to be of doubtful permanence. Chemical residues, especially those of an acid nature, are very harmful. Alum is an acid salt commonly used in paper sizing, and care must be taken that residues of this material in the paper are kept at a minimum. Other chemical residues such as those derived from the cooking and bleaching operations should also be reduced to a minimum. In employing coloring materials, only those of established permanency should be used, and only those which will not react chemically with other constituents of the paper.

Marketing Problems and Distribution Being Studied—A study of national marketing problems and methods of distribution, in co-operation with the large manufacturers and distributors, to cover the entire country, is being begun by the Bureau of Domestic Commerce. The bureau has already conducted a series of regional marketing surveys and published several reports. This study is now to link them all together into a network to present a picture of the entire country and its outlets for manufactured products. Distribution is the major field of study in the marketing of American products at home at the present time, and it is thought that by charting the vital trends in the practice of national producers this will be of inestimable value to business generally. The survey program, region by region, is bringing in information hitherto not available to even the largest organizations. When completed, this study will present an encyclopedia of knowledge of the buying habits and purchasing power of the American consumer everywhere. It is expected to complete this study this year.

Reducing Fire Hazards—Tests have been under way at the Bureau of Standards for a year now on methods of reducing fire hazards from matches, and experiments have been conducted recently to lessen the length of time of unnecessary burning of the stems of matches by using a coating on them. By rendering match stems more inflammable the Bureau hopes to reduce the fire loss incident to the use of a half-million matches used every minute, which will burn out as soon as they have served their useful purpose. As a result, a considerable gain in fire safety would result. The bureau has been conducting tests with matches whose stems are inflammably coated within a half-inch of the head. In its experiments the bureau found that cigars and pipes required from 6 to 14 seconds for satisfactory lighting, with an average of 10 seconds, while lamps, lanterns and cigarettes were lit on the average in half the time. Matches held with stems horizontal or with the head slanting upward, required on the average about 30 seconds before the stems were consumed or flaming ceased. It is assumed therefore that the margin in time of burning or length of stem burned between this limit and what is required for ordinary lightning purposes, causes most of the fires attributed to matches. Treating the matches to prevent burning much beyond the time required for their useful purpose was done by coating all but about one-half of the stem next to the head with waterglass. Matches so treated burned for only about half the time required by the untreated match to burn up or go out, and also were found satisfactory for lighting purposes.

Interstate Commerce Decisions—Rates charged on a carload of paper shopping bags, from Lockland, O., to Chicago, were found inapplicable in a recent ruling of the Interstate Commerce Commission, and reparation was awarded in J. S. Kirk & Co. vs. B & O R. R., No. 19289.

Collection of a reconsignment charge on a carload of paper bags, from New Orleans, La., to Scranton, Pa., in addition to rates to and from point of reconsignment, were found unreasonable and reparation was awarded in E-Z Opener Bag Co. vs. Erie R. R. Co., No. 19105.

Rates on paper and related articles, in carloads, from points in Wisconsin, Minnesota, Michigan and in Canada to Des Moines, Iowa, were found not unreasonable nor unduly prejudicial, and the complaint was dismissed in Greater Des Moines vs. Ahnapee & Western Ry., No. 18215.

In Northwest Paper Co. vs. Chicago, Milwaukee & St. Paul Ry., (No. 18775), the rate on rosin size, in carloads, from North Milwaukee, Wis., to Cloquet, Minn., was found unreasonable and a reasonable rate was prescribed for the future, with reparation.

In Consolidated Southwestern Cases (13086), the commission laid down a ruling on paper and paper articles, among many other commodities. This is rather a lengthy decision and those interested should apply to the commission for a copy.

Recent Customs Decisions—Plain writing paper and envelopes, packed in boxes, were classified at 3c per pound and 15 per cent ad valorem and the envelopes at 3c per pound and 25 per cent ad valorem under the provisions of pars. 1307 and 1308 tariff act of 1922. It was claimed that the envelopes should have been assessed at 3c per pound and 20 per cent ad valorem, and the U. S. Customs Court sustained the protest (No. 167509).

Stencil paper with coated surface, classified at 35 per cent under par. 1313, was claimed dutiable as manufacturers of surface-coated paper at 5c per pound and 20 per cent ad valorem under par. 1305. The protest was sustained (No. 247954).

Single and double thimbles, classified at 35 per cent ad valorem under par. 1313 were claimed dutiable as manufacturers of pulp at 25 per cent under par. 1303, and the protest was also sustained (No. 248844-G).

Hemlock and spruce logs classified at $1 per thousand feet board measure, par. 401, were claimed free of duty as pulpwood under par. 1700. The court found that the logs were 16 feet long and practically 6 inches or over at the top, which was held to constitute a log suitable for lumber. The fact that it was actually used for pulpwood was held not to control the classification and the protests were overruled (22418-G, Close & Stewart, Seattle).

Supreme Court Upholds Flexible Tariff—The Supreme Court of the U. S. upheld the constitutionality of the socalled flexible provisions of the Tariff Act of 1922 in a recent decision in J. W. Hampton & Co. vs. U. S. The court held that the fact that Congress declared that one of its motives in fixing the rates of duty, as provided in the flexible provisions, is so to fix them so that they shall encourage the industries of this country in competition with producers in other countries in the sale of goods in this country, can not invalidate a revenue act so framed. "If it is thought wise to vary the custom duties", says the court, "according to changing conditions of production at home and abroad, Congress may authorize the Chief Executive to carry out this purpose, with the advisory assistance of a tariff commission appointed under congressional authority."

Postal Rulings—Approval has been given by the Post Office Department to the use of a new envelope for facilitating the identification of matter carried by the air mail service. The outstanding and distinctive feature of the envelopes consists of a border containing alternating blue and red oblique parallelograms with intervening spaces between the two, the color of the envelope which should be white, producing a distinguishing blue, white and red border not exceeding five thirty-seconds of an inch in width extending around the edges of both the address side and the back of the envelope. The words "Via Air Mail" must appear in the upper right portion immediately below the space to be reserved for the postage stamps, postmarks, etc., in letters that stand out clearly and boldly. Such envelopes are not furnished by the department,

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but any manufacturer or other person or concern is at liberty, without any restriction, to make or print, or have made or printed, for himself or others, envelopes for air-mail use, prepared in the foregoing manner. Envelopes of this special design are to be used for air mail only.

The Post Office Department has issued instructions on post card rates to Canada, warning postmasters that the postage rate on post cards is 2 cents and on reply-paid cards is 4 cents, while the parcel post rate is 14 cents per pound or fraction thereof, with a weight limit of 15 pounds.

Trade Mark Rulings—In Tulip Cup Corp. and U. S. Machine Mfg. Co. vs. Ideal Cup Corp., Equity No. 2602, the U. S. District Court, Eastern N. Y., has held that the defendant could properly simulate the colored carton container of the plaintiff for his drinking cups without legal liability. The court also held the plaintiff's patent invalid for lack of invention. The court held that even though the defendant used the same colored containers as the plaintiff for his cups, that color was only an element of unfair competition, and that there would not be any confusion in the minds of purchasers as to the origin of the respective goods.

American Imports—A generally lower price level and a falling off in several leading import commodities, were the principal factors in the quarter-of-a-billion dollar decrease in American imports last year, according to "Our World Trade in 1927," just issued by the U. S. Chamber of Commerce. Receipts of standard newsprint paper, mostly from Canada, proved all-time records in both quality and value, the U. S. having imported nearly four billion pounds valued at $131,000,000 or an increase of 7 per cent in quantity and 6 per cent in value.

Wholesale Prices—The general level of wholesale prices in March was slightly lower than in February, says the Bureau of Labor Statistics. The index numbers with 1926 as the basis of 100 show up as follows:

	1927 March	1928 Feb.	1928 March	Purchasing power of 1926 dollar in March
Paper and pulp	92.8	90.9	90.5	110.5

Industrial Personnel Activities—A bulletin on industrial personnel activities recently issued by the bureau shows the work of 430 companies studied during the survey, including medical service, lunch rooms, recreation facilities, insurance features, etc. This study, contrasted with a similar one made 10 years ago, shows the lines of development of these features during the past decade. Other sections contain statistics of prices and trend of employment.

Women in Industry to Stay—The director of the Women's Bureau says that 75 per cent of the two million married women now gainfully employed at present are between 20 and 44 years of age, and that they are in industry to stay. Not so long ago, the average life of a woman in industry was about 5 years. But the swing now is towards increasing permanency. Women take employment young—when they leave school. If they stop work to get married, it is only for a short time before circumstances force them back to their jobs again. A whole set of new social and economic problems is the result.

European Pulp Manufacturers Control Price—Under the influence of the general lock-out in the Swedish pulp and paper industries, negotiations are reported between leading European chemical pulp manufacturers to reach a mutual agreement for a common price policy in future, and preliminary conferences have been held between German, Swedish, Finnish and Norwegian manufacturers, with the view to preparing a general sales agreement providing for fixing prices, and to take measures to avoid cut-throat competition in this industry.

Preparing Shipments to Latin America—The Bureau of Foreign and Domestic Commerce has just released a handbook on "Preparing Shipments to Latin America," which should be on the desk of every paper exporter. This book shows the proper marking or labeling methods, packing to secure lowest customs duty, meeting foreign documentary requirements, penalties for irregularities and means of relief, consular fees, entry and warehousing, sending and carrying samples, shipping by mail, etc.

The bulletin also discusses unfair commercial practices in international trade, showing how to safeguard commercial and industrial property rights and good will against uneconomic and unethical practices and unfair methods of competition.

Simplified Practice for Abrasive Products

A simplified practice recommendation for coated abrasive products was adopted at a general conference held April 11, 1928, at the Department of Commerce, Washington, D. C., under auspices of the Division of Simplified Practice. This recommendation provides that certain sizes and varieties of abrasive paper and cloth will be manufactured as stock items after September, 1928, which will, according to estimates given at the conference, care for at least 95 per cent of the trade.

Manufacturers present at the conference reported the estimated annual output of this commodity as $16.000,000, and that the number of sizes and varieties of abrasive cloth and paper has been increasing at a rapid rate.

According to the VDI-Nachrichten of Feb. 8, 1928, the Austrian Paper Industry increased its production in 1927 to 200.000 tons as compared to 198,000 tons in 1926 and 93,-000 tons in 1919. The production of cellulose amounted to 25.250 tons in 1919. but during 1927 it had reached the figure of 195.000 metric tons.

Fulton Engineering Co. Opens Western Office

The Fulton Engineering Co., designers and manufacturers of dryer drainage systems for paper machine dryers, has appointed as its western representative Woodbury and Wheeler Co.. 55 Second Street, Portland, Oregon.

This company is now planning to double the capacity of its plant at Middletown. Ohio. and this representation in the Western territory will enable it to care for the requirements of customers in the territory in a prompt and satisfactory manner.

New Catalogues, Books and Publications

Bayley Blower Co., Milwaukee, Wis.—An illustrated folder "Cold Facts on a Hot Subject", describes the Bayley Chinookfin Heater, which is a ventilating as well as a heating unit. The folder contains figures and capacity tables.

General Refractories Co., Philadelphia, Pa.—A very attractive booklet has just been received entitled "Choosing a High Temperature Cement". Important facts are given concerning various types of high temperature cements, their resistance or non-resistance to slag attack; resistance or tendency to shrinkage, performance at really high temperatures, etc. The booklet is well illustrated and will be of special interest to any one responsible for fire brick construction and maintenance.

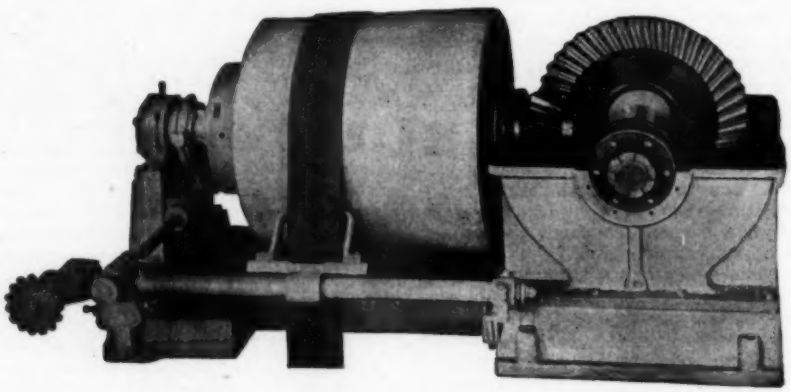
E. F. Houghton & Co., Philadelphia, Pa.—"Belt Dressing Facts" is the subject of a new booklet just out. It is well written and contains much valuable information on the proper care of belts. Every belt user should have a copy.

Ingersoll-Rand Co., New York City—A very handsome catalogue has just been issued by this company entitled "100 and 1 Ways to Save Money". The book contains 111 pages with index, and a description of all I-R equipment is given. Much of the information is conveyed by the large number of interesting illustrations in shades of ink which enhance the appearance of the publication and make it really a work of art.

National Safety Council, Chicago, Ill.—A new safety booklet entitled "The Safe Worker" is now being published monthly for distribution by industrial plants to employees. This booklet contains timely articles with suggestions for safe practices, also terse bits of inspiration for the worker. There are many illustrations, each conveying the story of safety. The price of these booklets is small, ranging from 4 cents for 100 copies to 2¼ cents for 3000 and over. Imprints will be furnished free of charge on lots of 1000 and over.

Palmer-Bee Co., Detroit, Mich.—A new 48 page catalogue has recently been issued describing the PB-Sykes Continuous-Tooth Herringbone and Improved Mill Type Spur Gear Speed Reducers. It contains tables of horsepower ratings and dimensions of standard size units, a list of the advantages over open drives, instructions for lubrication, installation, etc. Copies will be mailed gratis to anyone in charge of power maintenance, or the purchasing of this equipment.

Classification and Definitions of Paper Terms, The Lockwood Trade Journal Co., Inc., publisher—A new edition of this volume by Clarence J. West has been issued. There are 1450 paper terms drawn up by the Sectional Committee on Definitions, 250 more than contained in previous edition. This book is the first dictionary of paper terms ever compiled in this form and the only work of its kind available. The price is $1.50 per copy prepaid.



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WISCONSIN NEWS

Improvements and Expansions in Many Paper Mills

Consolidated Water Power & Paper Co., Wisconsin Rapids, Wis.—George W. Mead, president, announces that work has been started on a new finishing room, and that a new bleaching plant and clay treatment plant will follow.

These changes will provide for a change in production, as it is the intention of the company to change over from newsprint to groundwood book paper soon. Canadian competition has forced the shift to higher grades, especially because of the fact that the Consolidated now has ample newsprint facilities of its own across the border, in its high speed mill known as the Thunder Bay Paper Co., Port Arthur, Ontario.

In arranging for the new buildings, Mr. Mead is adhering to his policy of making each structure as attractive in its architecture as many public buildings, so that they will be a credit to the community. Each unit will be designed this way by Chicago architects.

The finishing room is to cover an area 97 by 114 feet, will be two stories high, and of steel, concrete and brick. This is to be the first unit of a larger department, as it is so arranged that its size can be doubled in the future. Trackage next to the building will be raised twelve feet and this will eliminate the installation of elevators, as the shipping room will be on the same level as the one now in use. The upper story of this building will be used for finishing and shipping, and the lower floor for storage.

Engineers of the company also are completing plans for the new bleaching and clay treatment plants. These will be large and modern, and will conform to the improved architecture. No contracts have been let, as the building is being done by day labor with W. F. Thiele in charge. These new units will be completed first, and the equipment then will be changed for the making of book paper.

Actual construction work also is under way on the Consolidated's new digester plant at Appleton, Wis., where its branch known as the Interlake Pulp and Paper Company is located. This plant, costing $350,000, will be one of the most attractive looking paper mill units in the Fox River Valley.

Bergstrom Paper Co., Neenah, Wis.—Contracts have been awarded for a new power plant and boiler house to take the place of obsolete equipment. Boilers will be purchased from the Erie City Iron Works, Erie, Pa., and the stokers from the Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa. The work is in charge of Orbison & Orbison, engineers of Appleton, Wis., and the improvements are estimated at $90,000.

Fort Howard Paper Co., Green Bay, Wis.—Installation of "save all" equipment has been completed by the use of which this company expects to make an annual saving of $15,000 by the salvaging of pulp from the mill drainage. The equipment is of the vacuum and filter type, which brings the loss down to one-half pound of pulp to 1,000 gallons of water.

This leaves one more step in the four-fold improvement program at the Fort Howard mill. The last unit is a new power plant, now almost ready for use. Housed in a building 50 by 80 feet, and 65 feet high, it will contain two water tube boilers with capacity up to 1,500 h. p., but planned for an average demand of 1,000 h. p. Under feed stokers of high efficiency will be used. The new plant has a smoke stack of concrete 193 feet high, 15 feet in diameter at the bottom, and 9 feet at the top. Later a turbo-generator will be added so that the plant will supply current to all motors in the mill.

The first unit in the $175,000 improvement expenditure was a new dock on the Fox river, making it possible for boats from the Great Lakes to bring cargoes of coal or pulpwood direct to the mill. This was followed by the erection of a warehouse covering 33,000 square feet of floor space.

DePere Paper Manufacturing Company, DePere, Wis.—A second paper machine is being installed with the expectation of doubling the capacity of the mill. The present output is 40,000 pounds of wrapping paper daily, produced by a crew of 45 men. This machine will be propelled by current from a generator just installed. The generator will be driven by a 600 h. p. motor made at the General Motors Company factory at Janesville, Wis.

Flambeau Paper Company, Park Falls, Wis.—The No. 1 machine at this mill is being overhauled completely and improvements added so that its future capacity will be 250 feet a minute. The company is also going over all its steam equipment to convert it to first class shape. Production has been curtailed for the time being but not interrupted, as machine No. 2 has been operating regularly filling orders.

Fox River Paper Co., Appleton, Wis.—Work is in progress on the installation of a new generator. It will be of 200 h. p. and is located at the main mill. Part of the steel work in the flume was removed after diverting the water flow, so that the machinery could be put in place on a new foundation. The contract for installation was awarded to C. R. Meyer & Sons Co., and about six weeks will be required for the work.

Menasha Printing & Carton Co., Menasha, Wis.—Increased production of wrappers will be possible through the installation of a large new press. The machine was built especially for this company by the Kitter Press Company, of Dover, N. H. It is a four-color machine, printing a sheet 84 inches wide at the rate of 48,000 feet an hour. It will be used entirely for bread wrappers of waxed paper, and its output is 125,000 wrappers an hour. The press is 22 feet long, 10 feet wide and 11 feet high. Its weight is approximately 34 tons.

Tariff Complaints

Paper napkin manufacturers of Wisconsin have won out in their protest made to the Interstate Commerce Commission against a ruling which forbid shippers to include napkins in carloads of paper towels and toilet paper, thus necessitating class rates of an exorbitant nature to points in the Southwest.

Mills contended that the commission's findings violated a specific order of that body in connection with what is known as the Minnesota-Ontario paper case. There the maximum reasonable commodity rates were fixed from points in Wisconsin and Minnesota to Southwestern cities. The commission has clarified the matter by using a supplementary report in which it states its position. It is understood now that the findings in the Southwest case were not intended to make any changes in the rates on paper insofar as they relate to cities in Northeastern Texas, and that the Minnesota-Ontario rulings will stand as heretofore. Napkins still may be mixed with towel and toilet paper carloads and carry the previous rates.

The investigation growing out of these protests appears to have convinced the commission that some of the rates on towels, napkins and toilet paper are discriminatory, and that reductions should be made. There is virtual promise that shipment to Dallas, Fort Worth and other cities in Northeast Texas will be given lower rates.

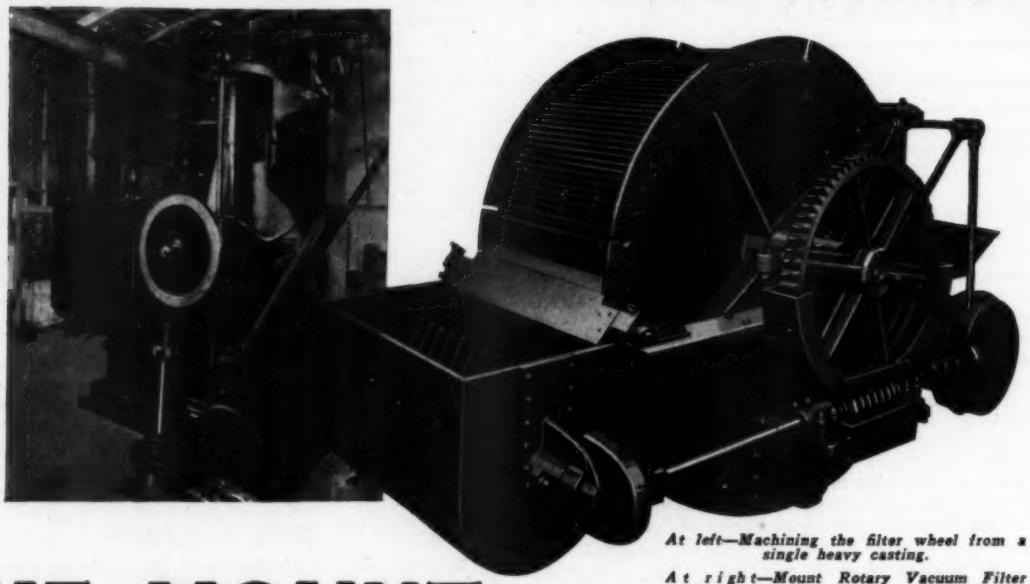
Newsprint, wrapping and tissue papers are the next target for rate revision demands on the part of the Wisconsin Paper and Pulp Manufacturers Association. It is contended by thirty-seven mills in a complaint filed with the Interstate Commerce Commission that Pacific coast mills have rate advantages over this locality and an investigation is to be made.

A specific example set forth in the complaint shows that newsprint can be shipped from Oregon and Washington to Dallas, Texas, for 79 cents a hundred pounds. Mills in the Fox River Valley are charged 74 cents. Although the difference in rates is small, it is pointed out that the distance from coast cities to Dallas is 2,200 miles, and from Wisconsin mills it is only 1,100 miles. This situation is prejudicial to Wiconsin manufacturers, it is contended, and should be remedied. Since the rates on higher grades also are on a relative basis, adjustment of these also is sought.

Marinette & Menominee Safety Contest

A safety contest which was conducted by the Marinette and Menominee Paper Company, of Marinette, Wis., and Menominee, Mich., has brought out several new slogans. Winners were selected by the National Safety Council, of Chicago, and first prize of $7.50 went to Harold Tupper. Many of the employes contributed slogans.

Among the best slogans were: "Safety costs nothing, but is worth a lot," (winner of first place); "Those who laugh at



At left—Machining the filter wheel from a single heavy casting.

At right—Mount Rotary Vacuum Filter equipped with resludger for continuous handling and washing of lime sludge in recovery department of sulphate mill. (Shop view with wire cloth removed.)

THE MOUNT ROTARY VACUUM FILTER

Mount Rotary Filter handling large tonnage of heavy cake.

answers the demand of the pulp industry for continuous equipment. The distinct success of this equipment through years of service proves that it is truly continuous, with time of shutdown for repairs practically eliminated. The fundamental design removes the cause of many shutdown periods experienced with some vacuum filters and the ruggedness of construction overcomes all mechanical difficulties.

We will gladly consult with you regarding any special problems. Descriptive bulletins on request.

SWENSON EVAPORATOR CO.

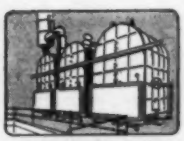
(Subsidiary of Whiting Corporation)

15673 Lathrop Ave., HARVEY, ILL. (Chicago Suburb)

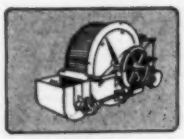
SWENSON

BASKET TYPE EVAPORATORS

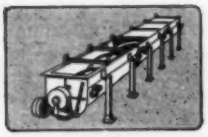
VERTICAL TYPE EVAPORATORS



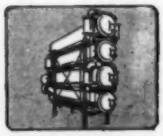
HORIZONTAL TUBE EVAPORATORS



ROTARY VACUUM FILTERS



CONTINUOUS CRYSTALLIZERS



YARYAN EVAPORATORS

safety never laugh last"; "Each time you think safety, it makes it easier next time, Get the habit"; "Care—carelessness—what a whale of a difference a few letters make."

Thus far, the safety efforts of this company have met with good success. The Menominee mill has operated approximately 275 consecutive days without a lost time accident. One of its departments has a record of 975 days, another 724 days. The previous record of this mill was 335 days and the employes expect to exceed this figure. The Park mill has not been quite as fortunate, although one department has a record of 802 safe days. Another has gone 428 days and a third, 223 days. The mill is nearing 100 days.

Industrial plants of the Rock River Valley, which embraces Janesville and Beloit, Wis., have begun a more active promotion of safety. Nearly 500 persons attended a safety conference there, coming from 33 cities. Regular gatherings will be held hereafter to take up discussion of safety measures. One paper mill man, F. H. Rosebush, of the Nekoosa-Edwards Paper Company, of Port Edwards, Wis., was named on the committee in charge.

Committee Appointed for Permanent Forestry Ass'n

Appointment of the committee which will work out a permanent commercial forestry organization for Wisconsin has been announced by D. C. Everest, of Wausau, Wis., general manager of the Marathon Paper Mills Company. Members are: R. B. Goodman, Marinette lumberman; H. J. Bell, secretary of the Milwaukee Association of Commerce; George F. Kull, secretary of the Wisconsin Manufacturers Association; O. T. Swan, secretary of the Northern Hemlock and Hardwood Association; Fred W. Luening, of the Milwaukee Journal, and W. R. Wheaton, manager of the Pulpwood Company, Appleton, Wis. The authority for Mr. Everest's action was vested in him as chairman of the commercial forestry conference held recently at Milwaukee, Wis.

There is activity everywhere in Wisconsin to bring about conservation and reforestation, as the result of aroused public sentiment. The Tomahawk Kraft Paper Company is planting a 100-acre tract of cutover lands with 200,000 trees. These are species suitable for pulpwood.

Backing is being given a movement to have 850,000 acres of Wisconsin lands taken over by the government for federal forests. These lands are not suitable for agriculture or other purposes but are ideal for the growing of trees, it is pointed out by J. P. Kneipp, assistant forester of the United States Forest Service. The Clarke-McNary act permits purchase of such lands by the government.

Authority has been given by the Wisconsin Railroad Commission to the Green Bay and Mississippi Canal Company, of Appleton, Wis., to issue bonds totaling $1,250,000. The company is taking advantage of the lower money rates to retire $350,000 worth of five year gold notes bearing interest of 5 per cent, and mortgage bonds amounting to $417,000. The new issue will be at 4½ per cent. Valuation of the real estate and water power franchises of the company is fixed at $1,283,814, and the total property and plant value is $2,448,021. Improvements and additions to the company's holdings along the Fox river below Neenah, Wis., are planned with the remaining funds of the new bond issue.

Four lives have been lost thus far in construction of the Wissota dam by the Northern States Power Company, at Chippewa Falls, Wis. The latest fatality is the drowning of Clyde Gordan, a workman 35 years old. He was carried away by the swift current when he fell off a pier.

Better water power control will be afforded mills at DePere and Green Bay through the installation of new sluice gates this spring on the Fox River dam at DePere. The government is doing this work and will spend about $100,000 on the project.

C. E. Peterson, staff member of the pulp and paper section of the U. S. Forest Products Laboratory, has resigned to become associated with the research department of the Champion Fibre Co., Canton, N. C. Mr. Peterson will work under the direction of John D. Rue, former chief of the Forest Products Laboratory's pulp research, who is now director of research for the Champion Fibre Company.

MICHIGAN NEWS

Michigan Superintendents Meet

The growing belief that America should grow its own rubber, prompted L. M. Mongreig of the United States Rubber Co. to select as his subject for the April meeting of the Michigan Superintendents Association, "Rubber Plantations".

Mr. Mongreig stated that Americans do grow their own rubber, in fact, the world's largest plantation is owned and operated by the United States Rubber Company, an American institution. In 1910 this company purchased large tracts of land in Sumatra and Malaya; cleared the jungles, built highways and railroads, hospitals and living quarters for the employees. After eighteen years, the company now owns 135,000 acres of rubber plantations, 87,000 acres of which are planted, with 54,053 acres bearing. At present 20,000 people are employed on these plantations. Mr. Mongreig used motion pictures to illustrate his talk.

The next meeting of the association will be held in conjunction with the Cost and Technologists' Associations, May 17. This is the last meeting of the year, and a large attendance is expected.

Monroe Paper Mills to Build

The Monroe Paper Products Co., Monroe, has started the erection of a $40,000 addition for the manufacture of cartons. The structure will be of concrete and brick. This company has called for redemption $140,700 of its 7½ per cent gold bonds due April 15, 1932, a premium of $30.00 per thousand dollar bond and accrued.

The Barrett Paper Products Company, Monroe, has announced that it will rebuild that part of its plant which was recently destroyed by fire.

Certificates has been filed for the Standard Paper Company, Kalamazoo, showing an increase in capital stock from $800,000 to $1,000,000 in 100,000 shares of $10 par value. Of the total, $800,000 has been subscribed and paid in.

Michigan Superintendents Open Membership Drive

The Michigan Division of the American Pulp and Paper Mill Superintendents' Association, one of the strongest units in the national organization, is conducting a membership drive to make its influence felt 100 per cent in the territory covered. While every mill superintendent in the Kalamazoo valley and adjacent cities is included in the line-up, it is desired to bring in certain others in the more remote cities.

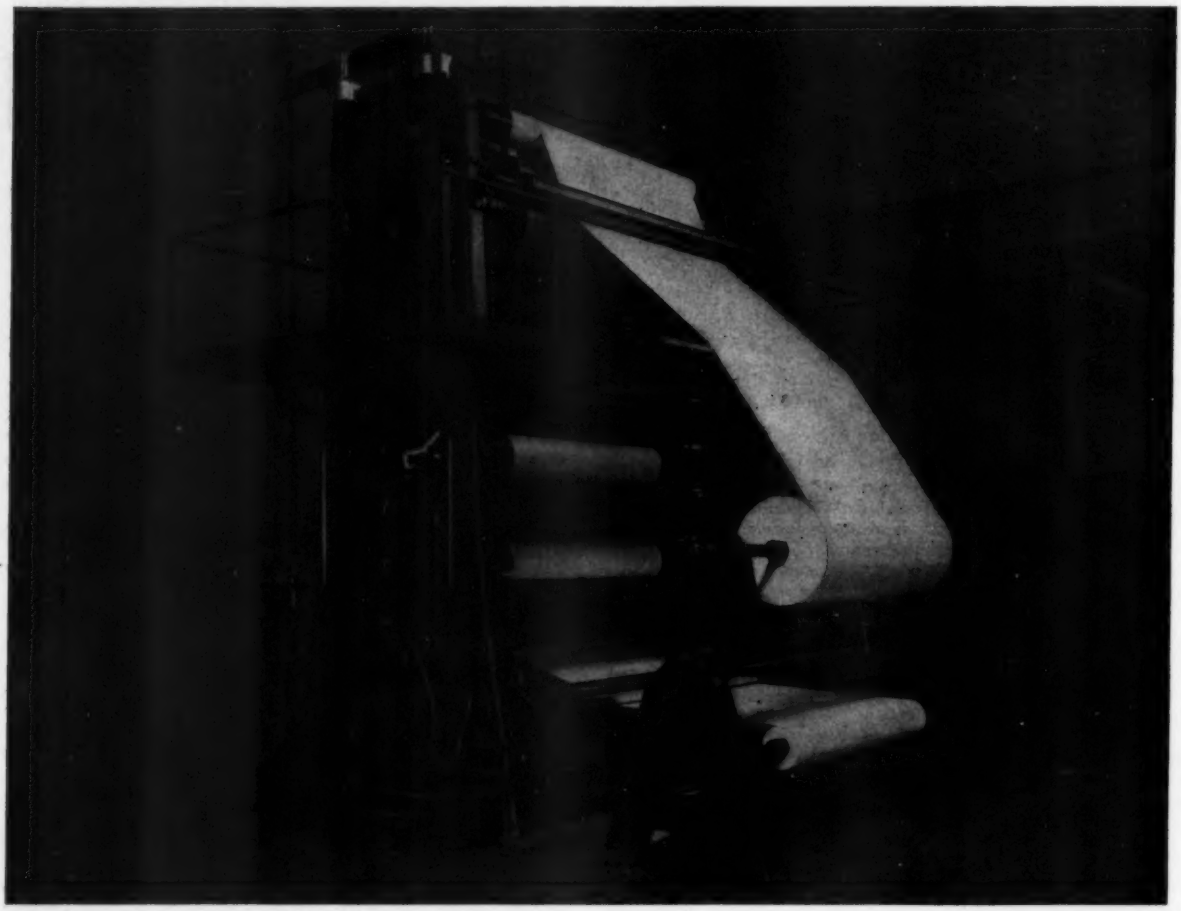
George H. Pountain, secretary, calls attention to the fact that the organization founded in 1919 on a very small scale, has now grown to ten divisions in the United States and one in Canada. The Michigan Division is one of the three that hold regular monthly sessions.

Clubs Favor Joint Meetings

The Paper Technologists' Club, made up largely of chemists from paper mills in the Kalamazoo Valley, is seeking closer co-operation between its organization and the Superintendents, Cost and Technical Associations. One of the features which is felt to be mutually beneficial is that more joint meetings will be held in the future. It has also been decided to hold meetings bi-monthly, instead of once a month. A committee is to be named, empowered to investigate systems of converting old papers and converting pulp.

The Technologists met April 11 at the Columbia Hotel, Kalamazoo. F. T. Loeffler of the United Organic Chemical

"NO CALENDER CAN BE BETTER THAN THE ROLLS IN IT"



Perkins 9-Roll Web Super-Calender

The importance of rugged strength in a stack is appreciated by everyone having to do with calendering

Photograph of this Perkins 9-Roll Web Super-Calender, taken in a Pennsylvania mill, gives an indication of the weight and the strength that the Perkins engineers have built into this machine. It is made to stand up and run steadily under the most severe operating speeds and conditions. In action it is a highly efficient production unit, easy of operation and low in power consumption.

This calender which is typical of the Perkins complete line of finishing machinery is living up to the Perkins standard—finishing paper in the ***most satisfactory way it can be done.***

In every detail it is built in full accord with Perkins Rolls whose leadership for half a century has been so generally recognized.

B. F. Perkins & Son, Inc., Holyoke, Mass.

COTTON ROLLS
PAPER ROLLS
EMBOSSING ROLLS
CHILLED IRON ROLLS
GRANITE PRESS ROLLS
WEB SUPERCALENDERS
GLASSINE SUPERCALENDERS
FRICTION CALENDERS

TRADE MARK REG. U.S. PAT. OFF.

EMBOSSING CALENDERS
SHEET CALENDERS
PLATERS
MULLEN PAPER TESTERS
TENSILE TESTERS
VENTILATING FANS
RAG CUTTERS
STOCK CUTTERS
PAPER DAMPENERS
BLEACH EJECTORS

and Products Co., Chicago, was the chief speaker. He spoke on the manufacture of glue and its uses in the paper mill. Ivar Lundbeck, chemist, Lee Paper Co., Vicksburg, gave an interesting talk on his recent trip to the Tappi meeting in New York.

The Michigan Paper Mills Traffic Ass'n elected the following officers for the ensuing year: President, Alex. G. Gilman, president Allied Paper Mills; vice president, F. M. Hodge, president Kalamazoo Paper Co.; secretary, George S. Davis, secretary Allied Paper Mills; treasurer, Charles S. Campbell, president First National Bank and Trust Co. and treasurer Kalamazoo Vegetable Parchment Co.

At a meeting held April 25, plans were laid for a convention of the Michigan Division of the Cost and Technical Associations of the paper industry to be held in Kalamazoo. June 20 and 21 were tentatively set as convention dates.

Five ships loaded with clay for Kalamazoo Valley paper mills are expected to arrive here from English ports between May 15 and June 15.

Mike Walsh, an employee of the Standard Paper Co., Kalamazoo, sustained minor injuries recently when he was struck by a falling bale of paper.

Jesse Nutter, an employee of the Kalamazoo Paper Co., recently sustained injuries when he fell and struck a lever.

Frank Mosteller, a former official of the Kalamazoo Vegetable Parchment Co., has joined the general staff of the Allied Paper Mills, Joseph Wettermann, a graduate of the Technical College of Paper Trade, Altenberg, Germany, has been engaged by this company as an assistant to W. K. Kidder, general chemist.

A steel construction workman recently sustained injuries when he fell 10 feet with a two-ton girder striking a cement floor, at the plant of the Kalamazoo Vegetable Parchment Co.

OHIO NEWS

April Meeting of Miami Valley Supts.

At the regular meeting of the Miami Valley Division of the American Pulp and Paper Mill Superintendents Association, held at the Anthony Wayne Hotel, Hamilton, Ohio, April 28, 1928, the principal speaker was H. A. Morrison of the Oliver Continuous Filter Company.

Mr. Morrison gave a complete and general description of the Oliver filter and outlined numerous special applications of these filters to pulp and paper mill work. A table was read giving typical Oliver performance on white water at at several representative mills on various kinds of production.

There are many ways in which paper mills can reduce white water losses, such as reduction of shower water by increased shower pressure, use of trough on outside wire rolls, use of wipers on inside wire rolls, diverting water that passes through machine wire by incline across machine so this water strikes inside wire roll, recirculation of suction water to showers, reuse of white water in beaters, and close supervision of water use in general.

The next meeting of the association will be held May 26, at the Hamilton Inn, Franklin, Ohio.

Charles W. Shartle Married

Members of the paper industry will be interested in the news of the marriage of Charles W. Shartle, formerly president of the Shartle Brothers Machine company, to Miss Helen Bridge, in Warsaw, Poland, April 28.

Mr. Shartle went abroad about a month ago but no intimation of the wedding was given at that time. The bride has been training nurses classes in the hospital at Warsaw, Poland, for several years, upon her return to Europe where she served with distinction in the World War at the battle fronts as a Red Cross nurse.

Sorg-Oglesby-Smith Operating New Power Plant

Although it is not operating at its fullest capacity, the new power plant furnishing electric power and steam for the Sorg-Oglesby-Smith paper mills is now in use. The last of the construction work has been completed and the huge plant set into motion, economizing and centralizing the power for the three mills.

The new plant, housed in a large brick building, on a site which is convenient to the three mills, is a product of work that has extended over a period of almost a year. Ground was broken for the power house May 9, 1927 and work has continued without interruption since that time.

When the power plant is running normally, the old power houses and smoke stacks will be demolished and the new electric and steam equipment will carry the entire load. The erection of this plant represents one of the most advanced steps in the paper industry of Middletown for many years.

When Z. W. Ranck, president of the Crystal Tissue Paper Co., returns from a Mediterranean cruise with his family the latter part of May, he will find several honors awaiting him.

One will be the news of his re-election as president of the Tissue Paper Manufacturers' Association of America and the other is that of president of the Middletown Rotary Club, both of which were bestowed upon him during the past few weeks.

The fifth annual convention of the National Association of Foremen will be held in Canton, O., Friday and Saturday, May 25 and 26, 1928. A very extensive program has been planned which includes addresses by men of importance in industrial affairs. An interesting feature of the convention will be visits to industrial plants in the vicinity, the Pennsylvania Railroad shops and the trade and vocational McKinley High School.

Change in Hoist Division of Chisholm-Moore

The Columbus McKinnon Chain Co., Tonawanda, N. Y. has recently acquired control of the hoist division of the Chisholm-Moore Mfg. Co., Cleveland, Ohio.

The general sales offices and factory will continue to operate at Cleveland under the same name as in the past, and it is felt this alliance will greatly strengthen the organization.

The Buffalo Foundry & Machine Co., Buffalo, N. Y., has acquired the assets, physical properties and patents of the Chemical & Vacuum Machinery Company. The Buflovak and Buflokast lines of dryers and evaporators will be supplemented with several new types. These include the spray film feed, applicable to both vacuum and atmospheric drum dryers; a new design of vacuum rotary dryer and several other modifications of present types.

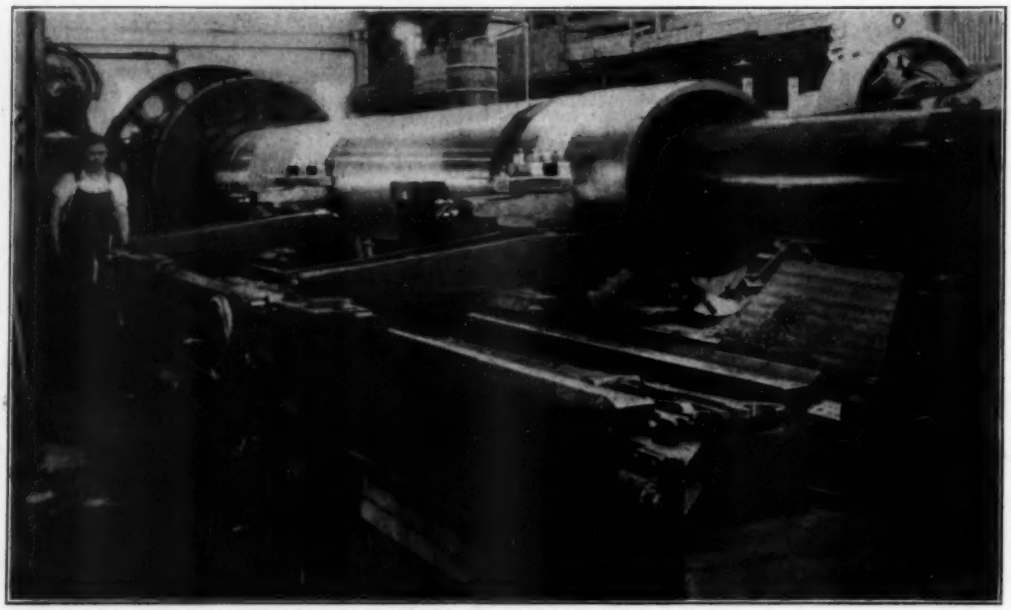
Continental Makes Stone Head of Rumford Plant

The Continental Paper and Bag Mills Corp., has appointed A. G. Stone manager of the bag division, to succeed Theodore Hawley, who, due to illness, has retired. Mr. Stone was made plant superintendent and production manager of the Rumford plant a year ago, and in January of this year was appointed manager of the paper division. This brings all of the properties at Rumford under his management.

The Rumford mill is one of the largest mills of the Continental. In the paper division there are ten paper machines, a 125-ton sulphite mill and a 45-ton ground wood mill, in addition to which a large quanity of kraft pulp is purchased from the outside. In the bag division there are 137 bag machines, also printing and decorating departments. The plant employs approximately 2300 people.

SUCTION COUCH AND PRESS ROLLS

Can Be No Better Than the Equipment
With Which
They Are Manufactured



One of Several Large Lathes Built Especially For Turning and Boring

SHELLS USED FOR SUCTION COUCH FIRST AND SECOND PRESSES

This lathe swings 8 ft. Has a bed 90 ft. long
The boring bar is 20 inch diam. 70 ft. long
The Bronze Tube in Lathe Cast in Our Own Foundry By Our Own Process
Is 36 Inch Diam. 27 Feet Long. Rough Weight 20 Ton

The Paper and Textile Machinery Co.

SANDUSKY, OHIO

BRITISH CORRESPONDENCE

Trade Conditions

Compared with the first quarter of last year, there has been considerable improvement in the output of British paper mills. Exports of writing and of all other classes of paper except newsprint, paper bags, and mill, straw, and cardboards, show an increase. General paper exports have increased in India and Ceylon; but there has been a drop in the trade with Australia. The fall in printing paper exports to that country alone being 65,689 cwt.

Imports show an increase. The January-February total of writings and printings exceeding that of the corresponding period last year by 2,700 tons. Newfoundland has increased her consignment of newsprint tonnage by 3,700 tons, and Canada's total has advanced by 1,420 tons. The improved state of employment in the paper trade and allied industries suggests that there have been marked improvements also in the home demand.

Newsprint manufacturers are passing through a rather difficult time. Prices are barely profitable, and foreign competition is formidable. The esparto section is in a fairly good condition. The North country mills being particularly well booked up with orders. The home demand has increased, but export orders are not too good. Wood-free papers are in fair demand, but there is room for improvement at the mills. A considerable tonnage of foreign paper is used to the dertiment of our home industry. Prices are steady and a fraction lower than a year ago. Buyers are obtaining the benefit of well-bought pulp, and concessions are occasionally offered for big tonnage. Quality is on a very high standard, and most mills are turning out a better sheet than ever before.

Business is very brisk in the wrapping section, despite an increased import of wrapping and packing papers. Most of our mills in this section are on full output. Recent examinations have proved that there is little or nothing to choose between British everyday standards, and the best papers imported from Scandinavia. The increased demand for British wrappings has justified the starting up of a new machine at Northfleet for the manufacture of kraft paper, and elsewhere there have been extensions of equipment, developments which trade leaders attribute to the success of the Safeguarding Act in its application to this industry.

Wholesale Stationers and Paper Merchants Meet

At the annual dinner of the National Association of Wholesale Stationers and Paper Merchants, held recently, the keynote of the speeches of both the president and the ex-president was the need for closer co-operation between papermakers and the merchants for the more equitable and economic distribution of their goods. Mr. Ramsbottom, the ex-president said that something must be done to prevent the senseless and cut throat competition that they all had at some time experienced. In order to attain this, it was necessary for both makers and merchants to get together and to ascertain if they could not come to some mutual arrangements for the distribution of their products. With this object in view, several joint meetings had been held and with some sections of the trade they had made apparent progress; but with others they had met with disappointments. He further said that the paper trade was one of the largest industries in the country; but, unlike most other large industries, it had not a regularly organized system for the equitable distribution of its products.

Lord Reading Addresses Papermakers' Association.

On the papermarkers' side, it is interesting to read that Lord Reading at the annual dinner of the Papermakers' Association, referred to the growing tendency toward amalgamation in all the big industries. Referring to the association in the connection, he said that working as they were for the benefit of the particular trade in which they were engaged,, they were contributing to the common good, the common welfare and the prosperity of the country. He referred to the benefits that the trade had derived from the investigations in technical knowledge made by individual firms and afterwards reported to the association.

The president of the association this year is A. Ralph Reed, who occupies that position for the third year in succession. In his speech at the annual dinner, he referred to the great advance that had been made in the last few years in this country with regard to paper mill equipment. New mills had been built and older mills had been brought up to date. Mr. Reed showed clearly where the Papermakers' Association stood in regard to import duties on paper. He pointed out that the brown and wrapping paper section of the trade had more than held its own during the past year. The Safeguarding of Industries Act had been in operation for nearly two years, and the result was that the figures for 1927 showed that the output of British mills had substantially increased, and foreign imports declined eleven per cent as compared with the previous year, and that so far from the price of wrapping paper having been increased, the average price of the imported paper, including the duty, had shown a steady reduction. He hoped that these results would be a source of satisfaction to all supporters of a measure that saved the wrapping trade from disaster.

Keen Competition for Argentine Business

Although the Argentine Republic is a valuable market for paper and stationery, Great Britain enjoys a very small percentage of the business, the bulk of the supplies being drawn from Germany though the United States, Canada, Norway, Sweden, Finland, and France also offer us keen competition in certain branches of the trade. The superior qualities of writing and book papers are usually drawn from Great Britain, but the largest call is for the medium grades, which are mainly of German origin. British exports of blotting paper are declining mainly on account of high prices, with a result that both the United States and Germany are securing a firmer hold on the trade. Great Britain enjoys an appeciable share of the trade in cardboard and paper labels, imports of which are fairly large.

Import and Export Figures

Below are set out the values of the various paper trade products as imported and exported in December, together with the increases and decreases as compared with the corresponding month of the two previous years:—

Imports:

	March 1928.	Inc. (+) or Dec. (—) as compared with 1927.	Inc. (+) or Dec. (—) as compared with 1926.
Papermaking Materials	639,741	—197,257	—174,660
Paper and Cardboard	1,243,876	—123,070	—222,794

Quantities of the same articles imported:

	Mar., 1926.	Mar., 1927.	Mar., 1928
Wood pulp, tons	74,477	93,817	75,573
Paper, cwt.	1,476,868	1,408,196	1,306,471

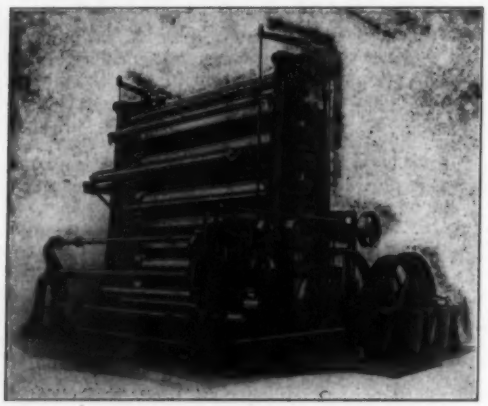
Exports:

	March 1928.	Inc. (+) or Dec. (—) as compared with 1927.	Inc. (+) or Dec. (—) as compared with 1926.
Paper-making Materials	121,469	+5,138	—40,668
Paper and Cardboard	742,374	—71,708	—226,852

Quantities of the same materials exported:

	Mar., 1926.	Mar., 1927.	Mar., 1928
Papermaking materials, tons	16,502	12,894	16,827
Paper & cardboard, cwt.	510,808	402,276	336,979

The Timken Roller Bearing Service and Sales Company announces the appointment of W. H. Post as manager of the Pittsburgh branch office of the company. Mr. Post has been with the company for several years, during which time he has been active in sales work in the Cleveland district.



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SIMPLIFICATION and standardization are cardinal principles of profitable plant management — recognized wherever progress is being made. We suggest that you thoroughly investigate Norwood Calenders with these principles in mind, asking only that you then follow the dictates of your own good judgment. We believe the result will be standardization on Norwood Calenders because they have so many exclusive advantages and outstanding features.

Check up on Norwood Super-Calenders, for instance, and notice these advantages: Tee slots entire height, so you can fasten platform brackets and other calender attachments at any height; All rolls removable without removing the calender caps, an important time-saving advantage; Practical, continuous oiling system, which assures you of added durability; Compound lever type pressure device, power or hydraulically operated, and power operated revolving reel which is controlled by a three push button station conveniently located to the operator.

These important advantages and improvements are standard in Norwood Super-Calenders. They are typical of the advanced engineering developments to be found in all of Norwood's machines and equipment.

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Norwood Engineering Co., Florence, Mass.

NORWOOD

Platers Super-Calenders Dusters Glassine-Calenders Rag Thrashers Breaker-Calenders Folding Machines Sheet Calenders Suction Boxes Filters

PACIFIC COAST NEWS

WASHINGTON

The Charles Christenson intercoastal steamer brought late in April 500 tons of general machinery supplies, including electrical apparatus and part of the woodworking equipment for the Grays Harbor Pulp company plant in East Hoquiam, Washington. The Grays Harbor Pulp Co. is a subsidiary of the Zellerbach Corporation.

Operations have begun on the reconstruction of the Grass Creek mill chipper plant at Hoquiam, Wash., which belongs to the Zellerbach Corp. This plant was gutted by fire early in April, with an estimated loss of $5000.

E. A. Barry, secretary of the Willipa Pulp and Paper Co. at Willipa Harbor, Washington, announced early this month that Ray Miller of the Puget Sound Bridge and Dredging Company and L. A. LaGuere were expected to return from the East the middle of this month. After their return from Eastern points where they have been making arrangements for the construction of the plant, an announcement will be made as to when actual construction starts.

Sales Promotion Dept. Organized by Everett

In line with the progressive policy of the Everett Pulp & Paper Co., Everett, Wash., a sales promotion department has been organized for the purpose of maintaining contact with distributors and through them with the consuming trade, co-operating with the dealers in their sales efforts and consulting with printers and publishers regarding their requirements, thereby endeavoring to broaden the mill's service and increase the consumption of its products.

J. L. Murray, who has been appointed director of this department, is unusually well qualified for this work, having had several years experience in the publishing and job printing business, as well as many years of success as a paper dealer. For the past nine years, he has been manager of a large distributing house at Seattle with which he served in various positions for nineteen years.

OREGON

Northwest Chemists Meet in Portland

The attention of the chemists of the Pacific Northwest was focused upon the pulp and paper industry during the pulp and paper symposium which was a part of The First Annual Pacific Northwest Regional Meeting of the American Chemical Society held at Reed College, Portland, Oregon, on April 6 and 7. W. H. Gibbons, in charge of the Office of Forest Products, U. S. Forest Service, Portland, was chairman of the pulp and paper symposium and one of the speakers.

Volume and Suitability of Pacific Coast Pulpwoods—The symposium was opened with this subject which was handled by W. H. Gibbons, chairman. It was pointed out that about one-half of the total stand of saw timber in continental United States, amounting to more than 1,000 billion board feet is located on the Pacific Coast. Of this, Washington has about 275 billion feet, Oregon nearly 400 billion, California around 280 billion and Alaska approximately 80 billion.

Mr. Gibbons went on to show what a comparatively small amount of this timber is being used for pulp at the present time, illustrating the fact with the statement that the total spruce-hemlock-fir stand in Washington, Oregon and California is nearly seven times that of related species in New England, but the cut for all paper purposes is smaller in the West by about 400,000 cords. The three Pacific Coast states contain more than 10 times the spruce, fir and hemlock stand of New York and Pennsylvania, but the pulpwood out of the latter states is more than half that of the Western States.

The richness of the land on the Pacific Coast, together with the combination of climate and rapidly-growing species results in stands of 25,000 to 200,000 board feet per acre, and it should be possible to grow spruce, fir and hemlock in these states on rotations of 30 years.

It appears entirely feasible for western Washington and Oregon to maintain permanently a sulphite and mechanical-pulp industry consuming from 3 to 3½ million cords of spruce-hemlock-fir cordwood a year, he said. By using the estimated growing rate of the spruce-fir forests of New England, he placed the annual production of pulp timber from Alaskan forests at 2,000,000 cords.

Paper Pulp from Logging Waste in the Douglas Fir Region—Allen H. Hodgson, associate forester, Office of Forest Products, U. S. Forest Service, Portland, in his remarks on this subject made the assertion that the use of powerful logging machinery in logging the very large logs in rough country of the Pacific Northwest region has created a large waste in the form of undersized trees, and broken and defective logs. In extreme cases, the volume of timber taken from the forest of merchantable logs amounts to only 25 per cent of the original stand. As the operations in Oregon and Washington increase in the next few years, it is believed the amount of waste will increase since the logging operations will take place in the more mountainous regions.

There is no reason, other than lack of pulpwood markets, why there should not be operations in Oregon and Washington designed primarily to secure pulpwood, or why operations in stands containing a large percentage of pulp species should not be designed to secure saw timber from the material most suitable for that purpose and pulpwood for the remainder of the stand. The speaker pointed out that several pulp mills in Washington have for their total supply of pulpwood sawmill waste.

In summing up the address, it was stated there are three ways by which life of the lumbering and wood-using industries, including the production of paper pulp, of Oregon and Washington can be extended. These are:

1—Revised tax laws which will encourage the protection and growth of young forests.

2—Prevention of forest fires in virgin and second-growth forests as well as on cut-over lands.

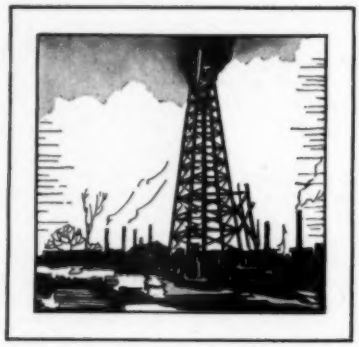
3—Better and closer utilization of the wood which the lands are producing.

Future of Pulp and Paper Industry on the Pacific Coast—In the absence of Mr. B. T. McBain, who was in New York, Vance Edwards, chemical engineer and pulp specialist, read the paper on this subject. The growth of the industry during the past quarter century was mentioned, and the demand that will be placed upon the pulp industry of the Northwest in coming years owing to the fact that the pulpwood forests of the New England and Middle Western States are practically extinct. Mr. McBain predicted that Alaska will be a great newsprint producing section with the next ten to fifteen years.

In conclusion, he stated that he did not advocate the building of more paper mills, for the industry in the United States and Canada taken as one is over-produced. However, there are many grades of paper being consumed on the Pacific Coast which are being manufactured elsewhere and shipped here in large quantities either from the East or foreign countries. These grades could readily be manufactured out here and with good profit to investors.

Co-operation of the University with Industry with Special Reference to Pulp and Paper—The gist of the address on this subject by Professor H. K. Benson, head of the department of chemical engineering, University of Washington, may be summed up in a suggestion he made as to how the university curriculum may contribute to the solution of the technological problems involved in the manufacture of pulp and paper. Perhaps the most obvious plan would be the institution of special courses in pulp and papermaking such as have been established in a few institutions in the United States and Canada, or the more common establishment of governmental agencies as the special laboratories at Toronto, Canada, and Madison, Wisconsin. However, the need for diversified training in fundamentals rather than in specific is far more appealing to those in charge of our educational progress. The need for technological training has been distinctly recognized in planning the Chemical engineering curricula now offered in some sixty institutions in the United States. In these

. . . She Gushes! . . . Oil!



THAT cry, which has since made a thousand millionaires, was heard for the first time in August 1859 when "wildcatters" brought in the first oil well in the United States at Titusville, Pa.

It was a little more than a year before this time that Asa Shuler and J. W. Benninghofen formed a partnership to manufacture paper making felts.

This partnership still exists among the descendants of these two men and they are making felts which embody the experience gained in these seventy years and three generations of experience. Naturally Hamilton Felts are better felts. It would be strange indeed if they were not.

Hamilton Felts are marked by two blue lines full width of the felt and by one shorter blue line midway between them.

It is this experience that dictates the entire process of making these felts which combine strength with great water removing qualities; that save in steam and coal costs; that wear longer and produce better paper with less down time for washing; that make money for the wise manufacturer who uses them.

But the test of a Hamilton Felt is in your mill on your machines. For purposes of comparison take your hardest one—put on it a Hamilton Felt, and give it the hardest test of use and performance you think a felt ought to have. Don't spare it. You'll come back and want these better felts on all your equipment.

Ask the Hamilton Felt man who is a practical paper maker as well as a felt expert the next time he calls. Tell him your problem. He'll have a felt for you that will meet it exactly. Most likely he calls on you regularly, or you can write to us direct.

Shuler and Benninghofen, Hamilton, Ohio

The Miami Woolen Mills

ESTABLISHED 1858

Hamilton Felts

curricula in addition to chemistry and physics, emphasis is laid upon mathematics and engineering and more recently there has been developed a course dealing with the unit operations of manufacturing. In this course, use is made of engineering methods as applied to the flow of fluids, flow of heat, grinding, evaporation, drying distillation mechanical separation, filtration, humidifying diffusion, absorption and extraction. Each operation is surrounded by the facts which are pertinent to it and by means of data contributed from chemistry, physics, mathematics, the various formulas and computations are utilized for governing and controlling operations.

Essentially it is a course that correlates the material scattered throughout the whole curriculum. It establishes a broadminded technical judgment that enables the scientific worker to reach into the appropriate field of science for the tools required to adjust and reconstruct a given process or operation in industry. It is possible, for example, to cover the essentials of every operation in the pulp mill without ever once mentioning the word pulp. In providing such training for industry, the university is engaged in the closest co-operation possible.

Nearly 200 persons attended the pulp and paper symposium. Owing to the lateness of the hour, no discussion followed the addresses. During the afternoon a number of the visiting chemists were escorted through the St. Helens Pulp and Paper mill and St. Helens, Oregon.

Northwestern Starts Construction

The contract for excavating and leveling the land upon which is to be located the Northwestern Pulp and Paper Company in the Youngs Bay Harbor district near Astoria, Oregon, has been sublet to Peterson and Scott, who began grubbing the land on May 7. The general contract for the construction of the pulp mill was awarded to The Austin Construction Company about the middle of April, announcement being made after Mr. B. T. McBain's return from New York where final arrangements were made. Mr. McBain is executive vice-president of the company and a pulp and paper specialist, and the plans were prepared under his direction by Henry Ford, pulp and paper mill construction engineer.

The contract calls for the completion of the mill within fourteen months after the date of starting work. The plant will have a daily capacity of about 130 tons.

Vance P. Edwards, chemical engineer and pulp specialist, will have direct charge of the plant. Mr. Edwards has had a number of years' experience, having been connected with the chemical laboratory of the Willamette Pulp and Paper Co., West Linn, Oregon, when that mill was under the management of McBain. In 1915 he took a position in the U. S. Forest Products Laboratory and later became general superintendent of the Interlake Pulp & Paper Division, Appleton, Wisconsin. Charles R. Flint, New York, is president of the company.

The headquarters of the Northwest Pulp and Paper Co. and the offices of Mr. B. T. McBain were moved last month from the Oregonian building to the Porter building, Portland.

E. G. Drew has recently established an office at 303 Lumberman's building, Portland, where he maintains Pacific Coast headquarters for the J. O. Ross Engineering Corporation, manufacturers of heating and ventilating systems, and the John Waldron Corporation, dealing in paper converting machinery.

Louis Collon, purchasing director of the Zellerbach Corporation, with headquarters at San Francisco, stopped in Portland during April on his way East where he expected to take care of business for the organization. He intended to visit in New York, Boston and Chicago.

J. W. Duvall was transferred from the Camas plant to the Portland offices of the Crown-Willamette Pulp and Paper Co. in the Pittock Block, last month. Mr. Duvall is establishing a department to work out mechanical problems. He has been with the organization for nineteen years in the capacity of superintendent of the bag factory department. During the time that he has been in the employ of this concern he has invented and patented twenty mechanical devices used in the industry. He is succeeded by Frank Gitsham of Chicago who has had thirty-six years of experience in Eastern paper bag factories.

New Bag Factoy at St. Helens

Announcement was made late last month that a paper bag factory is to be established in St. Helens, Oregon, by the C. H. Jaite company of Jaite, Ohio. Immediately following the announcement, three carloads of machinery were shipped to St. Helens, to be installed temporarily in a recently constructed building, and it is believed that the plant will be in operation by the end of this month. Additional machinery is to arrive within the next three months and will include a printing press, especially built for the factory, which will print four colors. At the present time, four experienced men from the factory in Jaite, Ohio, are on the premises, putting the plant in order.

The plant will manufacture multi-wall sewed bags for cement and plaster in two types, valve bags and open top bags. It will start with a capacity of 50,000 bags daily and additional units will be added later to increase the capacity. Fifty men and women will be employed at the start.

Harry O. Strom, who has been coast representative for a number of years, will be manager of the plant. C. H. Jaite, president of the company, was in the West about a year ago, looking over the field. He has been in the business for more than fifty years and has operated his plant at Jaite, Ohio, for sixteen years.

John R. Hanny, one-time manager of the Crown-Willamette Paper Co., died as the result of an automobile accident at Oregon City, Oregon, on April 15. His son, John E. Hanny, present manager of the company's plant at West Linn, who was with his father at the time of the accident, was injured.

Washburn Leaves American Hoist & Derrick

On April 30, the partnership interest of W. O. Washburn in the American Hoist & Derrick Co. was purchased and taken over by Frank J. Johnson, the senior partner and one of the founders of the business. The business will be continued as the American Hoist & Derrick Co. under the form of a corporation with the following officers: F. J. Johnson, president and treasurer; Howard S. Johnson, vice-president in charge of sales; Frederic Crosby, vice-president in charge of production.

No announcement has been made by Mr. Washburn as to his future plans.

New President for Combustion Engineering

H. D. Savage, for many years vice president of the Combustion Engineering Corp., New York, has been elected president of the company to fill the vacancy occasioned by the resignation of Joseph V. Santry. George T. Ladd has been elected vice chairman of the Board of Directors.

Mr. Savage brings to his new office a long and varied experience in the manufacture and sale of power plant equipment. He has been identified with the development of pulverized fuel burning equipment since its very inception, and is recognized as an authority on this subject.

Mr. Ladd is an authority in the design and manufacture of steam boilers, and has achieved success in this field.

The Rollway Bearing Company, Inc., Syracuse, N. Y., announces the appointment of Alfred E. Munch, Jr., as representative in the Chicago-Milwaukee District, with headquarters at 544 Railway Exchange Bldg., Chicago, Telephone Wabash 8169.

A. L. Broomall, manager of the Renewal Parts Engineering Department of the Westinghouse Electric & Manufacturing Company, passed away at his home in Wilkinsburg, Pa., April 10th. Mr. Broomall had been in the employ of the company for 22 years.

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MISCELLANEOUS MECHANICAL EQUIPMENT HEAVY IRON CASTINGS, ETC.

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For utilizing surplus or off-peak power. Outstanding features are:

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Cleanliness
Simplicity
Safety

Kaelin Electric Steam Generators have been built in capacities ranging from 100 K.W. to 42,000 K.W. at voltages from 550 to 13,200.

Alterations

Modernizing and re-building of all types of papermaking machinery to meet purchaser's requirements.

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Dominion Engineering Works, Limited, operate a special department for the regrinding of rolls and cylinders. Capacity up to 12 feet diameter and 270 inch face.

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Canadian News

Prospects of Newsprint Industry Remain Sound

Statistics respecting pulp and paper exports for the first two months of the current year have shown that the industry is progressing in a healthy manner. The period in question has shown a large gain in production, with exports maintaining a healthy ratio, while production in the United States is steadily diminishing. It has been necessary to keep production well under the installed capacity of the various units, but this has been effected without serious disturbance to earning power.

Another favorable factor has been provided by the annual reports of companies published within the past few months. These have shown that despite the disabilities under which the industry has been laboring, earnings have been well maintained and financial positions have been kept sound. Dividends have been maintained showing that many of the gloomy forecasts have not been realized.

It is also obvious that new production, which has been developing, will soon reach the maximum and that for some time at least there is little danger of disturbance from that source. With the natural increase in consumption a stage of stabilized output cannot be far off and it will be possible to attain a higher ratio of production to installed capacity, with resultant better earning power. The possibility of further consolidations from time to time will make for further solidarity and effective control of prices.

In all probability, the next few months will witness considerable increase in consumption in the United States with better business conditions in that country, together with the increase in the size of newspaper publications incidental to the Presidential campaign period. Interference from overseas imports is also on the down grade.

Scottish Firms Have Grievance

Scottish paper manufacturing firms complain that there has been a large shrinkage in the quantity of paper shipped from Glasgow to Canada since the war, and the Edinburgh Chamber of Commerce has directed a letter on the matter to Hon. James A. Robb, Minister of Finance at Ottawa. Scottish firms engaged in the paper trade allege that arrangements are in force between the Canadian paper makers and the Canadian dealers under which the latter have undertaken not to make purchases of paper outside of the Dominion unless the grade wanted cannot be obtained in Canada.

Many Scottish jobbers are said to regard this as in the nature of restraint of trade, but hesitate to protest publicly for fear they might not be able to purchase Canadian pulp when this is desired. It is pointed out that in the Dominion's tariff there is a preference for British made paper. Bearing this in mind, as well as the question of Canada's revenue, the Edinburgh Chamber of Commerce takes the stand that it is to the Dominion's disadvantage to exclude British paper to so great an extent through these internal arrangements.

According to a letter by the Hon. Victor Gordon, High Commissioner for Newfoundland in England, published in the London "Times", International Paper has a large staff of timber cruisers at work in the vast area of Labrador which, by decision of the Privy Council, has been adjudged to belong to Newfoundland, and it is possible that this company may take part in development of the Great Falls of the Hamilton River, the largest single undeveloped water power and forest reserve remaining on this continent.

Rene and Andre Kulback, of Esthonia, recently landed in this country. They are graduates of the forest school of a prominent German University and also have had practical experience in their native country and other parts of Europe. They hope to secure employment in the pulpwood and paper industry and thus extend their practical experience.

Forest fire losses in Canada during 1927 were the lowest in recorded annals. In all, 3,766 fires were reported in Canada during the last calendar year, and these burned over an area of 481,373 acres, the total damage and loss sustanied being placed at $1,396,055. This low record is equal to about 20 per cent of the loss suffered in 1926.

Some time ago the Pope Appliance Co. brought suit against a number of Canadian paper mills for infringement of patents for paper making improvements, such as the pitch of fourdrinier wires, Sheehan roper carrier, Pope air appliances and the Pope reel. This suit was tried and decided in favor of the Canadian paper manufacturers. It is understood that the Pope Appliance Co. has now filed notice of appeal to the Supreme Court of Canada.

War on the spruce bud worm, whereby millions of dollars will be saved to the country, will be carried on during the coming season by the civil aviation service in co-operation with other governmental departments. The forests of both Eastern and Western Canada will be protected. Canadian aeroplanes also will continue the work of making aerial surveys and preparing adequate maps of the Dominion, half of whose surface has not yet been seen by man according to an official estimate. During the last five years 200,000 square miles have been mapped by aviators, co-operating with other officials working on the ground.

QUEBEC

Dr. Hibbert on Educational Tour

Dr. Harold Hibbert, head of the department of cellulose and industrial chemistry at McGill University, has been granted a leave of absence, and will visit Europe to make a study of the physical, colloidal and organic properties of cellulose, as well as the properties of natural fibers in general.

He will spend some time in London, where he expects to interview a number of prominent cellulose and carbohydrate chemists, and will then proceed to Germany, where he will remain for some time in Berlin. While there he will collaborate with Professor R. O. Herzog, of the Kaizer Wilhelm Institute, on certain problems in cellulose chemistry.

This coming session Dr. Hibbert will have fourteen scientific workers engaged in different researches relating to cellulose and paper chemistry.

It is intimated in pulp, paper and power circles that a big pulp and paper mill will be built at Frazer's, above Deschenes on the Ottawa River, on the property now owned by the Canadian Power and Paper Investments Co., Ltd., by the Canada Power and Paper Co., Montreal, the recently formed holding company which controls the Laurentide-St. Maurice merger. This would be with a view to using the large timber limits recently acquired by the Laurentide Company from the Hawkesbury, Pembroke and Edwards companies.

Forestry Bill Amended

Hon. Honore Mercier, Minister of Lands and Forests, has put through the Quebec House the measure providing for forestry inventories on all Crown lands under lease. The clause to the effect that only 80 per cent of the annual growth may be cut was withdrawn. This clause provided that after

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May 31, 1930, only 80 per cent of the annual growth could be cut, except in areas affected by insect disease, or ravaged by fire or wind. Where, however, a lease already contains the 80 per cent restrictive clause, it will continue in force.

A special authorization will be required to permit of any cutting beyond the general regulations, and in order to obtain such permission the limit holder must show his plans based on a proper inventory executed under the instructions of the Minister. The Government will also give special right to cut down trees which have become over-matured or affected by disease.

About one hundred fire rangers recently attended a convention at the Parliament Buildings, Quebec. This was the first time that such a convention was held, and it was organized for the purpose of discussing the work and conditions of the inspectors. Henri Kieffer, chief of the forest protection service, presided, and the inspectors discussed with him and with his assistant, Henri Methot, their work and the condition in the different parts of the province.

Dosher Bendix and Co. Secure Wharf

As reported in these columns last month, Doscher, Bendix and Co., of New York, who are steamship agents, ship brokers and forwarding agents particularly interested in the importation of wood pulp and paper stock, have opened a Montreal office and have made arrangements with the Montreal Harbor Commission to secure the wharfage necessary to handle the 68,000 tons of Scandinavian pulp which they expect to import into the United States this season by the St. Lawrence route instead of through United States Atlantic ports.

The Harbor Commission has leased to the company the timber depot and saw mill on Bickerdicke Pier, formerly occupied by the British Empire Lumber Co., for the temporary storage of westbound cargoes enroute to United States paper mills. Alterations are being made in order to meet the requirements of the importers, including the building of a covering extending over an area of 81 by 300 feet, which will protect men discharging the cargoes and will also protect the pulp against the elements.

Brompton to Change its Capitalization

Directors of the Brompton Pulp and Paper Co., at a meeting held recently in Montreal, adopted a plan of capital rearrangement, subject to ratification by shareholders, which should improve the position of common shareholders, and strengthen the financial position of the company. In brief, the plan entails the sale of 150,000 additional shares of common stock, which will be offered to shareholders on a share for share basis at $53. This will leave 300,000 shares of common outstanding, and nothing else. With the proceeds of the stock sold, it is the intention of the company to retire the outstanding preferred stock and bonds.

A special meeting of shareholders has been called for May 3d for the purpose of passing on and approving the plan. An agreement has been made with Dominion Securities Corporation to purchase the 150,000 shares of additional common, which will be issued under the proposed plan at $50 per share, but with the stipulation that present holders of common stock shall have the right to subscribe for new shares at $53 per share on the basis of one new for every share at present held.

Reorganization of St. Lawrence Paper

Formal announcement has just been made to shareholders of St. Lawrence Paper Mills, Ltd., of the plan to sell this company to a new organization. Under the new arrangement, the entire undertaking and assets of the present company will pass to a new company to be known as St. Lawrence Paper Mills Co., Ltd. This new company will have an authorized capital consisting of 190,000 shares of $100 par value 6 per cent cumulative preferred stock and 1,000,000 shares of no-par-value common. The entire 190,000 shares of preferred and 190,000 shares of common will be sold together in units, a further 310,000 shares of common will be sold, and 200,000 shares of common will be reserved against the exercise of subscription warrants. These subscription warrants will be issued as part of the plan to purchase common at $4 per share up to and including April 15, 1933. This will finally leave 300,000 shares of the common stock in the treasury. Under these arrangements the present company will receive sufficient money to pay $125 per share to preferred shareholders and $110 per share to present common shareholders, both in cash.

Of the common shares of the new company, executive officers of the present company will retain their interest in the new company through purchase of 180,000 common shares at a price not less than that paid by the bankers. The banking group purchasing control of the present company consists of Dillon, Read and Co., Dominion Securities Corp., and Flood, Barnes and Co.

A special meeting of shareholders of the present company has been called for May 7th, when approval of the plan will be asked, and also a change in by-laws to facilitate the sale of the company. Holders of common stock of the present company will be allowed prior right to subscribe to the new company's common stock on a basis of five of the new for each one of the present.

The directors recommend the plan for acceptance by the shareholders and consider the price to be received by the holders of the preferred and common stock for their respective holdings to be fair and equitable. The plan will also have the advantage of enabling the new company, with the additional cash resources which will accrue to it through the sale of its stock, to finance additions and extensions now contemplated on more favorable terms than the present company could obtain.

International Fibreboard Co., a Canadian International Paper subsidiary, is embarking upon an advertising campaign featuring its product, Ten Test Board. The Ronalds Adversiting Agency, Ltd., Montreal, has been appointed to direct the company's publicity.

Comparative Prices of Recent Paper Mill Deals

The following figures showing the approximate prices paid or to be paid for the properties of the Bathurst, Howard Smith Paper Mills, Donnacona and St. Lawrence Paper Mills, will doubtless prove interesting. The price in each case is obtained by adding the outstanding bonds and preferred shares to the total price paid for the common. The prices can only be approximate, for in some instances the senior securities have been redeemed at their call price. Net operating profits are the figures shown in 1926 as being applicable to depreciation, income tax, bond interest and other junior charges. The figures on timber and power holdings give a partial indication of the value back of each company. Moreover, in any such comparison the value of contracts such as St. Lawrence now has for its output and the expansion plans of both St. Lawrence and Bathurst must be taken into consideration. The comparison follows:

Company	Approx. Price	Net Oper. Profits 1926	Timber	Power
Bathhurst	$13,000,000	$853,000	2,600 sq. m. 18,000,000 cords	10,000 hp. dev. 40,000 hp. undev.
H. Smith...	11,600,000	855,000	500 sq. m.	
Donnacona.	13,500,000	856,000	5,400,000 cords	11,000 hp. dev.
St. Law'nce	16,300,000	970,000	*5,250,000 cords	35,000 hp. und.

*1926 figures since greatly augmented.

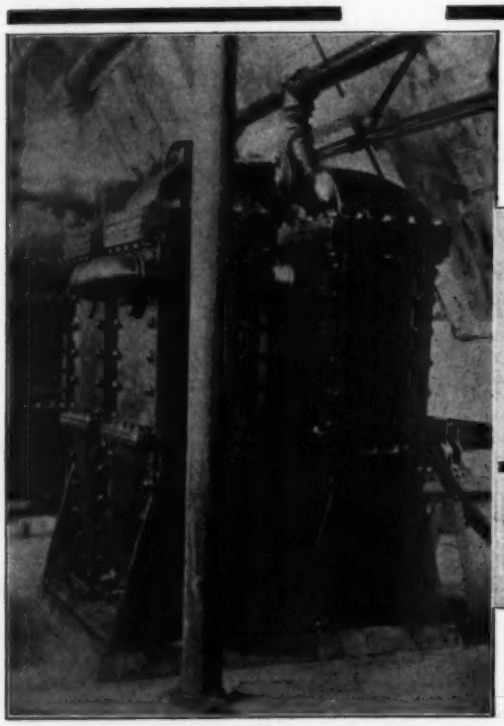
Price Bros. Show 2.88 Per Cent on Common

The annual report of Price Bros. and Co. for the year ending February 29, 1928, is a very satisfactory exhibit in consideration of the fact that the news print industry as a whole was operating under somewhat adverse conditions, with over-capacity at the mills forcing a reduction in output during the bulk of the period under review. Net profits are shown about $16,000 higher than for the previous fiscal period, while the earnings on the common stock outstanding were equivalent to 2.88 per cent, as compared with 2.72 per cent for the preceding fiscal year.

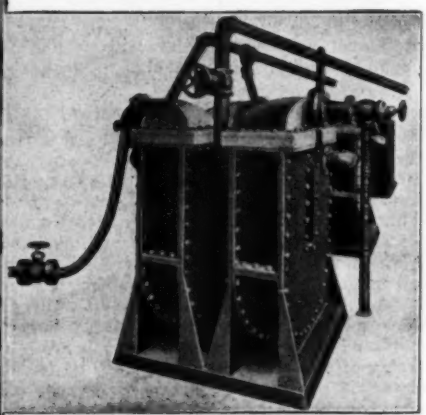
In this connection, however, it is pointed out by the president that the company obtained the benefit of increased

RYTHER AND PRINGLE COMPANY
CARTHAGE N.Y.

WOLF COOLER



SULPHITE RELIEF GAS



INCREASES CAPACITY
SAVES FLOOR SPACE
RECLAIMS WASTE HEAT

The Wolf Relief Gas Cooler consists of a unit made up of 1/2" lead tubes assembled in a cast iron case. The water chamber is built for pressure operation and the counter flow principle utilized. Each unit has 100 sq. ft. of heating surface and is 4 times as efficient as an open cooler. The cooling water can be used for flooding purposes.

FOR CANADA REFER

CANADIAN INGERSOLL-RAND COMPANY, LIMITED
10 PHILLIPS SQUARE, MONTREAL, P. Q.

earnings from the Riverbend mill. The balance sheet reflects plant expansion at Riverbend, current assets and current liabilities both showing very substantial increases, while net working capital is lower by about $800,000, although still at the very comfortable figure of over $4,000,000.

Price Bros. and Co. have ordered sectional electric drives from the Harland Engineering Co. of Canada for the two new paper machines for their Riverbend mill. These machines are to be equipped with Minton vacuum dryers, and the drives will comprise 22 motors, driving individual dryers through worm gears.

St. Regis Paper Co. of Canada, Ltd., has announced the removal of its offices from 11 Place d'armes, Montreal, to the Themis Building, 10 St. James St., Montreal.

The S. S. Philip T. Dodge, freighter chartered by the Canadian International Paper Co., was the first ocean-going ship to report her presence in the Gulf of St. Lawrence this year. The ship had been undergoing repairs in the old country, and left for Canada on March 24, bound for Three-Rivers, and possibly Montreal.

The St. Lawrence Paper Mills will install two new paper machines in their mill at Three-Rivers. They are at present operating four machines, and by January, 1929, they plan to have the additional two in operation. The new machine room is to be large enough for four paper machines, but only two will be installed this year. There had been a rumor around Three-Rivers for several months past that St. Lawrence contemplated this addition, but little was known about it, and only very recently was it stated as a definite fact. Inquiries have already been sent out and construction work will start at once.

Improvements and Expansion of Canada Paper

Confidence in the growing demands of Canadian business is best shown by enlargements being made in plants all over the country, marked among which is the expansion in the paper industry. Canada Paper Co. is one of the leaders in this movement, as is shown by the additions and alterations to their two mills at Windsor Mills. The St. Francis mill is being remodeled to manufacture white papers only, and will be equipped with one 155-inch machine and one 72-inch machine. The Windsor Mills mill is being re-equipped to make colored papers, kraft and other wrappings. There will be three machines here, 135, 92 and 72 inches wide, respectively.

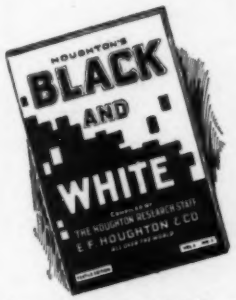
The capacity for producing pulp is being doubled. The pulp will be washed with Oliver filters by the most up-to-date methods. The sludge will be washed by Mount filters built by the Canada Iron Works, Three-Rivers. As in the past, this chemical pulp will be made at the Windsor Mills mill, and that part of it that will be used at the St. Francis mill will be pumped through a 3500-foot pipe line.

Every effort is being made to have the mills conform with the latest approved methods of manufacturing. Stock will be automatically supplied to the beaters. A clean water supply is guaranteed at all times by a complete modern coagulating system and pressure filter equipment. Brass pipes throughout the mills will keep the water clean and assure paper free from specks. The installation of three generators for the production of electric power is being arranged for, thus eliminating much of the old shafting and belt drives. Both mills are being equipped with the latest heating and ventilating systems. Conveying equipment is being designed and set out in such a way that material will be routed with the least possible handling.

The building program at the St. Francis mill includes a new machine room adjoining and parallel to the present main building, and a modern finishing room connecting with and running at right angles to the machine room. These new finishing quarters will have a floor area of approximately 75 by 250 feet, and will be two stories high. The first story will contain the latest in supercalenders, winders and cutters, leaving the top floor for final packing and storage. The new

BLACK AND WHITE

Free to all readers of THE PAPER INDUSTRY



Don't rush! Don't even push! It is not spiritualistic Scotch which we are offering you free but intellectual American.

BLACK AND WHITE IS the name of a new HOUGHTON periodical. It tells things in plain black and white. Nothing that is "high brow" is permitted. In fact true science is never "high brow." The greatest president, the best politician, the most intelligent statesman, and the most loyal and lovable citizen this country ever had was Abraham Lincoln, a man who used plain words for plain people. That's what BLACK AND WHITE is.

Read BLACK AND WHITE and defy the "bull."

Read BLACK AND WHITE and know the truth, uninfluenced by advertising pages.

AND READ IT IN WORDS TO WHICH YOU HAVE BEEN INTRODUCED.

Here is your opportunity to learn more about paper mill practices; why lubricating oils are deteriorating in quality; what constitutes the quality difference in various leathers; why some cylinder oils are better than others. Please understand the editorial pages of BLACK AND WHITE ARE RELIGIOUSLY PROTECTED AGAINST ADVERTISING OF ALL KIND.

Fill out the coupon below and receive free information which is costing $100,000 per year to collect and publish.

IMPORTANT—Write plainly or print and consider whether you want to receive BLACK AND WHITE at the mill or at your home address.

E. F. HOUGHTON & Co.,
Box 6913,
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At no cost to me whatsoever please enter my subscription to the new Houghton publication, BLACK AND WHITE.

Name .....

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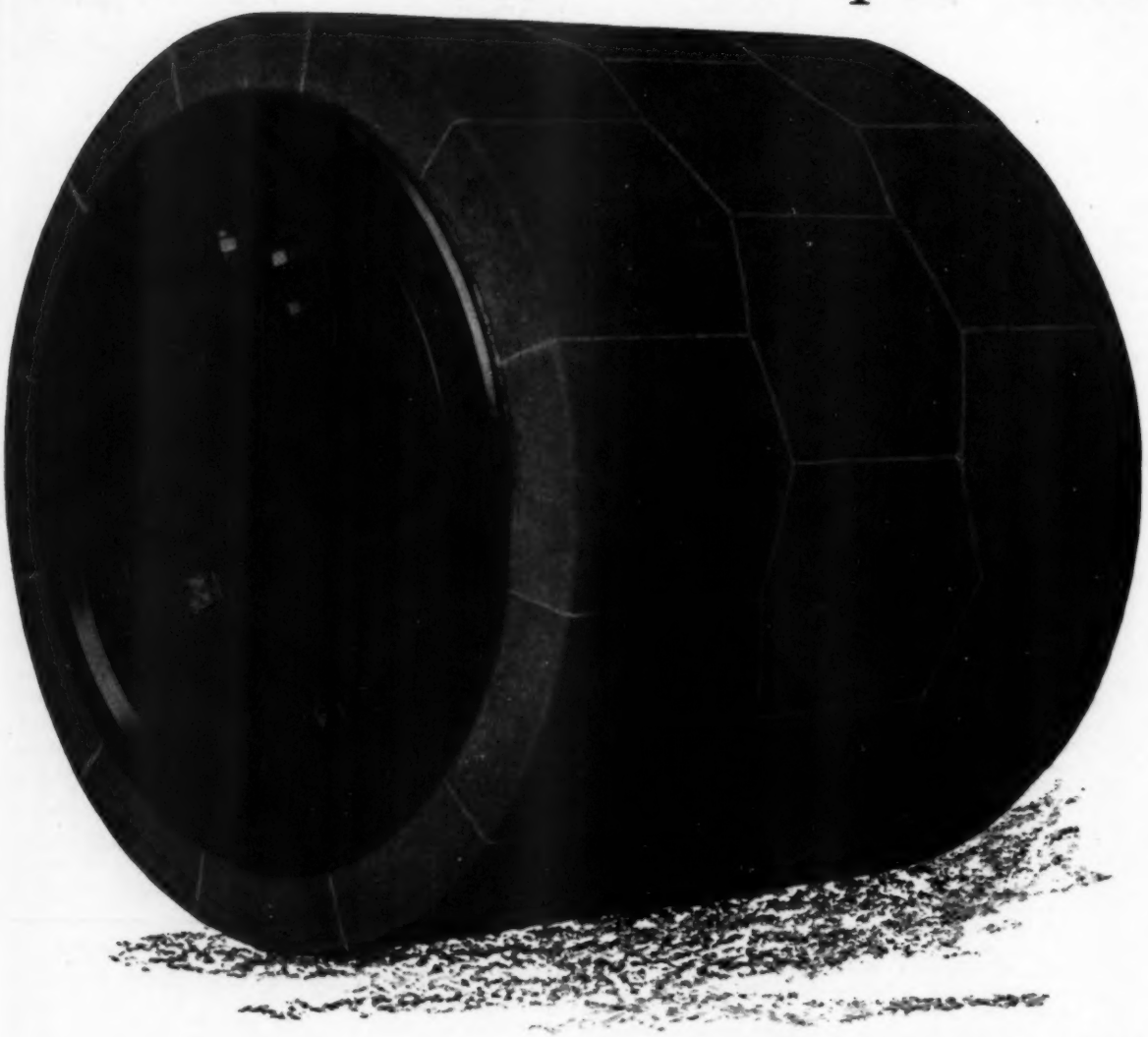
Long Life
High Production
Low Cost per Ton



NORTON COMPANY, WORCESTER, MASS., U. S. A.
Canadian Trade now supplied from Canadian Plant

NORTON
PULP STONES

beater room and bleaching plant is being erected on the other side of the main building.

The doubling of the capacity of the chemical pulp plant at Windsor Mills has necessitated much remodeling and adding to in all its departments. New office buildings, stores and machine shops will follow quickly on these changes, and with the completion of these readjustments, it is predicted that the Windsor Mills and St. Francis mills will be among the most modern on the Continent.

Canada Paper Co. was established in 1859, making it older than the Dominion itself. It is always gratifying to see an old company with fine traditions keep in the lead of progress.

St. Maurice Valley Corporation in their Cap de la Madeleine mill are turning out a coarse paper board made largely from groundwood tailings. One side of the sheet is smooth while the other resembles a very fine grid. This paper board is sold to Building Products, Ltd., of Port Neuf, and made into wall board of about one half inch thickness. This is accomplished by sticking several sheets of the coarse paper together by means of a preparation which has practically the same properties as the common household water glass. The fact that one side of each of the layers of paper is ribbed means that there are very fine air spaces between the two surfaces of adjoining sheets, making it a very effective insulating board.

The newly elected president of the Three-Rivers branch of the Canadian Manufacturers' Association is A. M. Creighton, of the St. Lawrence Paper Mills, who has been very active in the affairs of the association for the past few years.

ONTARIO

Criticism of Pulpwood Policy

Calling on the legislature to appoint a special committee or commission, independent of any political party, to make a survey of the pulpwood and timber areas of the Province so as to determine what areas had been sold and remained undeveloped, what area remained unsold, and what areas had been disposed of which should not have been sold, the Liberal leader in the Ontario House recently moved a resolution of censure on the Department of Lands and Forests, and challenged the Government to give an explanation of the course pursued in the disposal of the timber wealth of the Province.

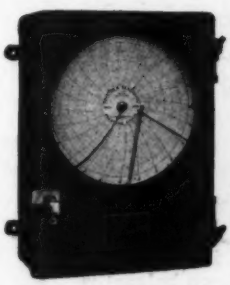
The resolution did not come to a vote, being withdrawn by Mr. Sinclair, following the defense put up by the Hon. Mr. Finlayson, Minister of Lands and Forests, who freely admitted that the tenders called recently on the sale of limits had been, in fact, nothing but a matter of form, and that they had already been earmarked for the Shevlin-Clarke, Backus, and other interests, before they were advertised. This information, he stated, was a well-known fact in the pulpwood and lumbering industry, where everyone knew that they could not if they would bid against them. The policy of the Government was to sell no timber limits in the Province except in cases where companies could prove that they would have to shut down unless material was given for them to work on. In this case, the sales were necessary to keep Northern Ontario towns on the map.

The Liberal leader attacked the Government for not having cancelled contracts for the delevolpment of timber limits made by the Drury Government with Backus, the Spruce Falls interests, and others, which had not been strictly lived up to, declaring that the limits could now be sold to higher bidders. The Minister replied that these companies had built up the lumbering industries of the Province, and that it would be beneath the dignity of the Government to cancel contracts simply because the markets were bad.

The office, storehouse and cement sheds at the construction plant of the Great Lakes Paper Co., at Fort William, were destroyed by fire recently. The cause of the outbreak has not been established. Officially the company has not

At B. D. Rising Paper Co. Plant

An interesting method is used to maintain a constant pulp level in beaters; as illustrated by the above photograph. The two Bristol's Recording Liquid Level Gauges, mounted on wall, provide continuous records of beater pulp level. Any variations are shown up at once, thus aiding operatives in controlling the level of pulp within certain limits. In this way all guesswork is eliminated, and a more uniform quality of pulp produced.



Bristol's Rectangular Form (moisture proof) Recording (Pressure) Liquid Level Gauge.

This installation of Bristol's equipment has been in continuous use for several years, and quoting from a recent communication ".... is operating O. K. .... very satisfactory."

—which again demonstrates the ready adaptability of Bristol's Recording Instrument equipment to pulp paper mill requirements. Simply and ruggedly constructed throughout, "Bristol's" can be depended upon for accurate trouble-free service over many years.

Bristol's Sales Engineering Service is at your disposal in selecting similar equipment. There is no obligation. Write.

The Bristol Company

Waterbury, Conn.

WE ARE PLEASED TO ANNOUNCE:—

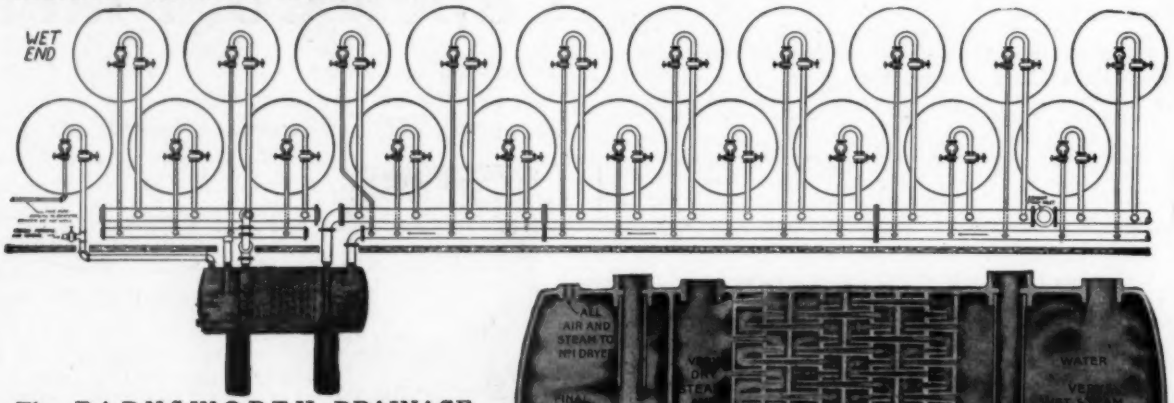
that we have just finished equipping all the roofing mills of the Certain-teed Products Corporation with Farnsworth Drying Systems and Farnsworth Boiler Feeding Systems.

Excellent results have been obtained in all cases, a big increase in production has been made and at the same time a big saving in fuel.

We are at present equipping several more mills with Farnsworth Drying Systems, Boiler Feeding Systems and Pressure Pumping Systems. Among these mills are

Kellog Boxboard Co. ..... Chicago, Ill.	Anglo-Canadian Pulp & Paper Mills, Ltd. Limoilou, Quebec
Ohio Boxboard Co. ..... Rittman, Ohio	Lake St. John Power & Paper Co. Ltd., Dolbeau, Quebec
Munising Paper Co. ..... Munising, Mich.	Dexter Sulph. Pulp & Paper Co. ..... Dexter, N. Y.
Cincinnati Paper Co. ..... Lockland, Ohio	Hawley Pulp & Paper Co.
West Jersey Paper Co. ..... Camden, N. J.	Kalamazoo Vegetable Parchment Co. . Kalamazoo, Mich.
National Paper Products Co. ..... Carthage, N. Y.	Downingtown Paper Co. ..... Downington, Pa.
Logan & Long Paper Co. ..... Franklin, Ohio	Grays Harbor Pulp Co. ..... Hoquiam, Wash.
Bogota Paper Board Co. ..... Bogota, N. J.	National Paper Products Co. .. Port Townsend, Wash.
North End Paper Co. ..... Fulton, N. Y.	Washington Pulp & Paper Co. .... Port Angeles, Wash.
S. Austin Bicking Paper Co. ..... Downingtown, Pa.	Container Corp. of America ..... Manayunk, Phila., Pa.

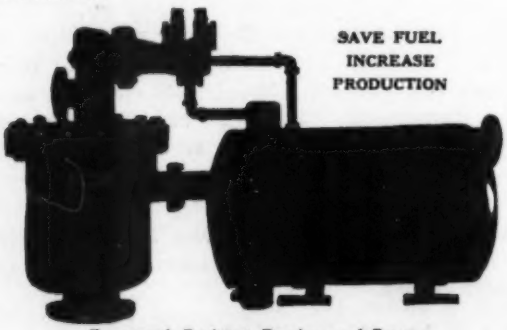
WHEN IS YOUR MILL GOING TO STEP INTO LINE WITH THE OTHER PROGRESSIVE MILLS AND INCREASE PRODUCTION AND SAVE FUEL WITH FARNSWORTH SYSTEMS?



The FARNSWORTH DRAINAGE RECEIVER AND PUMP (shown below) is used in all Certain-teed roofing mills for boiler feeding.

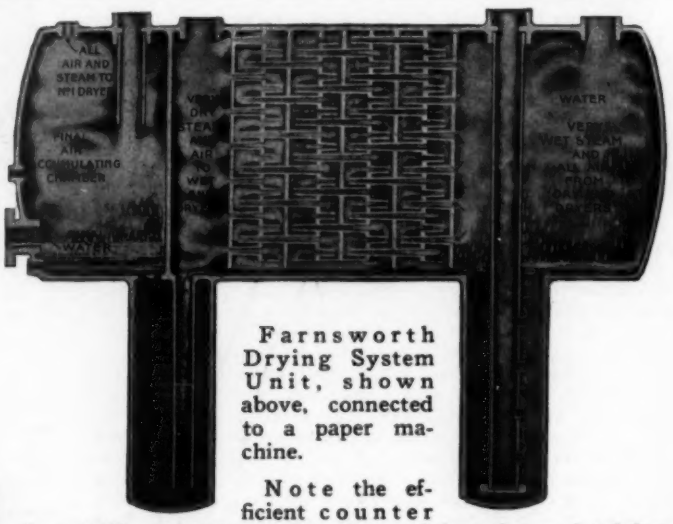
It saves fuel by pumping high temperature water with less steam consumption than any boiler feed pump.

Working parts, packings and oils are eliminated and maintenance reduced to a minimum.



SAVE FUEL
INCREASE
PRODUCTION

Farnsworth Drainage Receiver and Pump



Farnsworth Drying System Unit, shown above, connected to a paper machine.

Note the efficient counter flow baffle separator and water seal legs for maintaining pressure differential.

All water and air is completely and continuously extracted from every dryer by the Farnsworth Drying System. Pressures are reduced, production increased and a better quality of sheet is made. Shrinkage is reduced and cockles eliminated where improper drying has been the cause.

FARNSWORTH COMPANY

Heat Reclamation Engineers

CONSHOHOCKEN, PENNA.

estimated the loss as yet, but pending a survey of the damage operation in the plant was suspended.

One of the paper machines in a Port Arthur mill recently made a record run of over 300 tons of newsprint, sufficient to fill twelve cars, without a single break. The machine ran from 9 o'clock Monday morning until 11:40 p. m. Wednesday night without a break.

E. C. Martin, formerly sales manager of the Interlake Tissue Mills, Toronto, has been appointed general sales manager of the Saranac Pulp and Paper Co., of Plattsburg, N. Y., and the Independent Paper Mills, Inc., of New York. The direction of the two companies will be from the mill at Plattsburg, N. Y.

Students Visit Howard Smith Mill

Members of the Chemical Industry Club, composed of students in chemical engineering at McGill University, were guests of the Howard Smith Paper Mills at their Cornwall plant, recently. The party, accompanied by J. N. Stephenson, principal of the Institute of Industrial Arts, was escorted through the mill of the Canadian Cellulose Co. by Manager Tomlinson, and the sulphite and paper mills and bleach plant by Mr. Graham, chief chemist.

The new machine room, in which is housed the 153-inch machine now being delivered by Dominion Engineering Works, is nearly completed. It completely encloses the whole of the original paper mill, erected nearly 50 years ago.

Abitibi Jottings

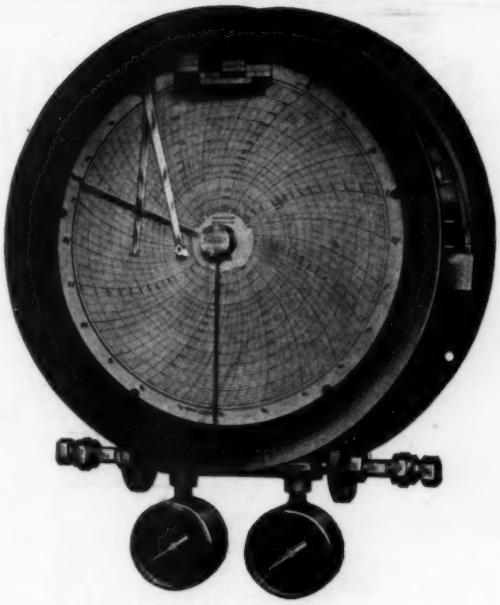
It has been decided to move the head office of the company from Montreal to Iroquois Falls, where the largest mill of the company is situated. The change is being made in view of the fact that a large number of the company's mills are now located in Ontario, at Fort William, Sault Ste. Marie, Sturgeon Falls, Espanola, Iroquois Falls and Smooth Rock Falls. The company will maintain branch offices in Montreal and in Toronto.

According to vice-president W. A. Black, the change in head office location does not necessarily mean that the shareholders will be required to go to Iroquois Falls to attend the annual meetings. The holding of the latter will be determined by the directors, and it is likely that they will take place either in Toronto or in Montreal. A vast amount of detail has arisen in connection with the recent merger, and it is understood that the number of directors on the board will be increased.

The Lake Du Parquet operations of the woods department of the company are closed for the season. The delivery of wood purchased from Quebec settlers is also finished, and a lot of the wood will be stream driven. The purchase of pulpwood from Ontario residents, mostly along the Temiskaming and Norther Ontario Railway, has also been concluded. The total output of limit and purchased wood for the Iroquois Falls mills was 215,000 cords. It is quite a triumph for the organization to have carried out the work so successfully considering the depth of snow was much greater than a year ago and also came much earlier in the season. The cruise of the timber limits of the Abitibi Fiber Co. is not yet completed. It has been suspended for the time being, but will be resumed about the first of June.

A group of managers of some of the Abitibi mills recently paid a visit to Iroquois Falls. They were Col. C. H. L. Jones of Spanish River mills, C. C. Irvine, of the Pine Falls (Manitoba) mill, D. G. Calvert, of the Fort William mill, and C. R. Van de Carr of the Beaupre (Que.) mill. After an inspection of the mill at Iroquois Falls and of the bush operations in the neighborhood, they went to Smooth Rock Falls to inspect the sulphite plant of the Abitibi Fiber Co. From there they went on to the Beaupre mill.

A strong syndicate, headed by the National City Co. and including Wood Gundy and Co., Royal Securities Corporation, Peabody, Houghteling and Co., and Peabody, Smith and Co., recently made offer of an issue of $16,000,000 Abitibi Power and Paper Co. 6 per cent cumulative preferred stock at 102 per share. The purpose of this issue is to retire bonds and preferred stock of subsidiaries bought into the recent Abitibi-Spanish River merger, at a material annual saving in interest and dividends.



Your Biggest Source of WASTED FUEL

Right out in the mill where steam is used for process work is the place where staggering wastes of fuel can occur—that's where Foxboro Instrument Control can make remarkable fuel savings for the paper mill.

Think what it would mean—for example—to have your drying rolls automatically kept at just the right temperature without wasting a pound of steam. Foxboro Automatic Temperature Recorder-Controller handles this job successfully.

From pulp to finished product it will pay you to investigate the possibilities of Foxboro Instrument Control. Foxboro helped one large Eastern paper mill to reduce coal consumed per ton of paper from 3,000 pounds to 1,900 pounds. It can do the same for you.

Each Foxboro Recording and Controlling Instrument is sealed with a definite guarantee that the instrument will do just what we claim for it. Foxboro Instruments are the only instruments so guaranteed. We suggest that you get in touch with our nearest branch.

THE FOXBORO COMPANY

Neponset Avenue, Foxboro, Mass., U.S.A.

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PITTSBURGH · CLEVELAND · ROCHESTER, N. Y. · ATLANTA
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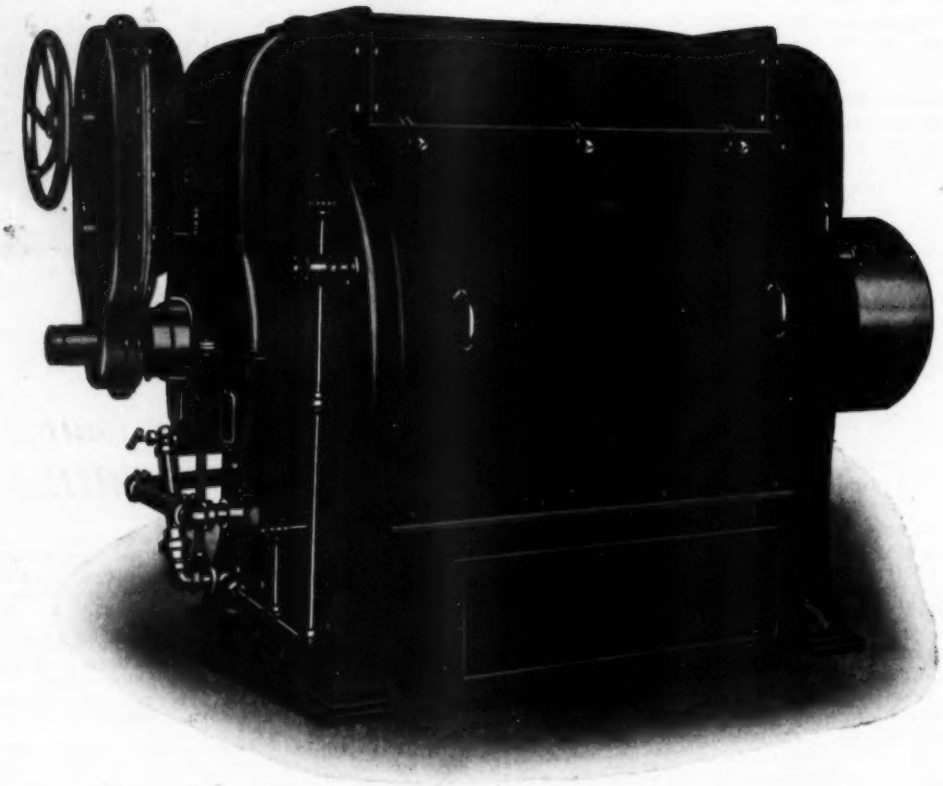
THE COMPASS OF INDUSTRY

INSTRUMENTS FOR CONTROLLING, RECORDING AND INDICATING TEMPERATURE, FLOW, HUMIDITY AND PRESSURE.

REED-SPAFFORD PULP SCREEN

(Built in two sizes)



The REED-SPAFFORD PULP SCREEN is remarkably efficient. Its capacity is large and its power consumption is surprisingly low. Let us show you what a saving this screen means to you.

Our Paper and Pulp Machinery is CONSTANTLY IMPROVED

Improved Paper Machinery Co.

Nashua, N. H., U. S. A.

SHERBROOKE MACHINERY CO., Limited

Sherbrooke, Quebec, Canada

H. D. Bean, purchasing agent for Abitibi, who has been with the company for the past eleven years, has accepted a position with the Canada Coal Co., with whom he will have charge of the extensive connections of this concern with the pulp and paper mills of Quebec, a field with the requirements of which he is thoroughly conversant.

Five new English "Moth" planes will be added this summer to the fleet of sixteen machines now in the service of the Ontario Forestry Branch.

Presentation of Safety Shield

J. N. Stephenson, editor of the Pulp and Paper Magazine, visited paper mills in St. Catharines, Merrition, Thorold, and Toronto last month.

The principal feature of the trip was the presentation to the Lincoln Pulp and Paper Co. of the trophy offered by the Magazine for the best record in preventing accidents for six months, from July 1st to December 31st, 1927. The mill was shut down for the occasion, the presentation taking place in the finishing room. Mr. Natwick, president, and Arthur Tuckwell received the trophy on behalf of the management and employees. K. S. Maclachlan, general manager, and A. P. Costigane, secretary-engineer of the Ontario Pulp and Paper Makers' Safety Association, also made appropriate remarks.

An ambitious program of reforestation, which will include the establisment in the Port Arthur district by the Ontario Forestry Branch of a large nursery, and the setting out of acclimatized trees in approximately 10,000 burned-over acres in the district, has been outlined by the Provincial Government. In reference to the Government's determination to reforest this section of the Province, it was stated that it was prepared to set out as many trees as is necessary. The Department has three nurseries producing approximately 10,000,000 trees. It is ready to set out from 100,000 to 1,000,000 trees in the Port Arthur district. A considerable sum of money will be expended in this and future work in the Thunder Bay district.

Ivan Moffit is now the executive secretary of the Canadian Paper Trade Association, which organization now has its offices on the fifth floor of the York Building, corner King and York streets, Toronto. Mr. Moffit was formerly with N. L. Martin, assignee and chartered accountant, who for years has held the secretaryship of the Canadian Paper Trade Association, with Mr. Moffit as his assistant. The latter has now taken over entire charge of the work with a separate office and excellent qualifications for the duties of the position.

NEW BRUNSWICK

The Department of Lands and Forests of New Brunswick has transferred the Crown land leases held in the Province in the Restigouche River basin by the Fraser Companies to International Paper. In addition to the area in New Brunswick, there is an extensive area in Quebec, the greater part of the property acquired by the new owners being in that province. These limits are to be operated in connection with the pulp and paper mill the company is commencing to build at Dalhousie.

The Bathurst Power and Paper Co. has announced that by July, when its second machine is installed, the output of its newsprint mill will be 130 tons daily. The capacity at the present time is 65 tons.

Formal ceremony will mark the turning on of the power at the Grand Falls power station during August. At present the equipment for the station is being installed. While plans as revealed last fall called for the formal opening of the power station early in July, it has been necessary to defer the opening because of retarded preparations for receiving the power by the pulp and paper companies, and others who have arranged to take Grand Falls power.

Installation of the fourth fine paper machine at the Fraser Paper, Ltd., Madawaska, Me., paper mill has been completed and the machine is now in operation. The company's first three machines are turning out approximately 125 tons per

"Up to Her Ears in Work"

The picture above shows the "AMERICAN" Locomotive Crane owned by the Pacific Lumber Co. at Scotia, California, piling redwood logs. The crane is pretty much obscured by its own handiwork, but after all, what you want is to see what the crane will do—**and this is it.**

The logs in the pile range from 3 to 10 feet in diameter and from 14 to 32 feet long.

In sending us the picture Mr. Paul M. Schmook, Resident Engineer of the Pacific Lumber Company said: "The pictures will convey a true idea of the kind of work your crane can do day after day.

Tell us to send a copy of the "AMERICAN" Locomotive Crane Book, which shows and describes the entire line.

AMERICAN
HOIST & DERRICK CO.
Saint Paul, Minn.
New York, Chicago, Pittsburgh, St. Louis, New Orleans.

OLIVERS

Oliver Save-All

"They decided to have eight by ten and eight by twelve Olivers shipped assembled by rail as soon as possible because of losing hundred dollars daily until two Save-Alls installed. Will probably have eight by fourteens shipped same way."

This is a telegram and "they" are one of the largest Paper Companies in the world. Also "they" already have many Olivers so know what they are talking about. If Olivers catch dollars for them, Olivers will do the same for you.

See page 378 in the 1927 Paper and Pulp Mill Catalogue.

Oliver Continuous Filter Co.

San Francisco
882 Cunard Building
Oakland, Calif.
4th & Madison Sts.

New York
1547, 33 W. 42nd St.
Johannesburg, South Africa
E. L. Bateman, Locarno House

London
150 Southampton Row, W. C. 1
Honolulu, T. H.
W. A. Ramsay, Ltd.

day of high grade sulphite papers. With the fourth machine in operation the output will run approximately 160 tons per day. Construction of the Edmundston groundwood mill is proceeding satisfactorily, as is the installation of board and catalogue paper machines at Madawaska. These last units are expected to come into full operation during September.

NOVA SCOTIA

Kamyr Wet Machines at Sheet Harbor

In line with their policy of extension of capacity and reduction of cost of production, the A. P. W. Pulp and Power Co.. have ordered three patented Kamyr wet machines for their large groundwood mill at Sheet Harbor. These three machines will replace the present battery of wet machines, hydraulic presses and their accessory pumps.

Paper Machinery Limited, with whom the order was placed, state that this type of Kamyr machine produces groundwood in sheets, ready for baling, containing 60 per cent air-dry pulp.

250-Ton Mill on the Mersey River

While the pulp and paper project sponsored by I. W. Killam of Montreal, with the site at or near Liverpool, will produce 250 tons of newsprint at the outset, the tentative plans call for an increase in capactiy to approvimately 400 tons daily. At the start it is estimated that about 300 men will be employed, with prospects of about 500 men being on the payroll in the future. The intention is to expend about $12.000,-000 in the buildings, power operations, lands, etc. Mr. Killam has agreed to buy pulpwood from the Provincial Government at the prevailing stumpage rate on Crown lands, instead of effecting leases on these lands from the government. The nucleus of the wood supply will be from lands owned by the new concern, and an agreement has been entered into that none of the wood will be exported from the province.

Keen interest is being manifested in the project, involving as it does the development of power from the waterfalls on the river as well as the manufacture of pulp and paper. Indications are that the industry will be the second biggest in Nova Scotia, when completed. It is possible that a start on construction will be made during the summer or fall.

The mild weather of the later winter and early spring was favorable for the construction operations on the pulp mill being erected at Hantsport for the Minas Basin Pulp and Paper Co. The work has been rushed and indications are that the entire plant will be completed by the latter part of the summer at the latest.

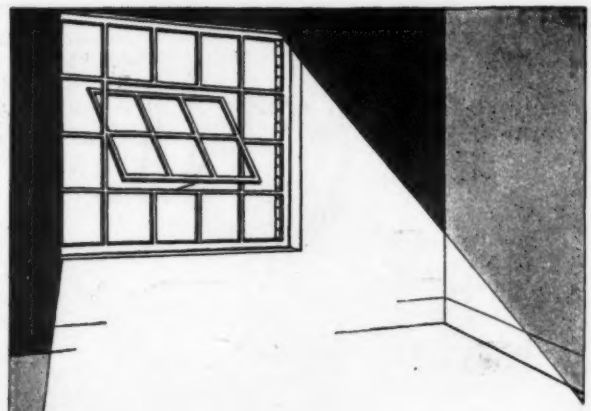
MANITOBA

It is reported that plans for the construction of a $6,000,-000 two-machine mill near Winnipeg are being made by an Ontario paper manufacturing company. Pulpwood for the mill will be obtained from the Davidson Chicago concession in south-eastern Manitoba, where the amount of timber is estimated by private interests at 2,000,000 cords, with considerable pulpwood in the sapling stage.

Since February 1927, when the first car of newsprint ever shipped from a Manitoba mill reached Winnipeg, 85,000 tons of Manitoba-made paper have been shipped, and an average of a dozen cars a day are now leaving the Pine Fall mill. The model town which sprang up in the bush around the mill now has 1600 inhabitants, beautiful homes, modern schools and a hospital.

BRITISH COLUMBIA

The Provincial Government has authorized the development of the Nimpkish River, on Vancouver Island, by the Canadian



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WINDOWS cleaned with Oakite let in *all* the daylight. They are clean and brilliant—without a trace of film, dirt or soot.

And Oakite makes light work of it—cleans them quickly, with little effort and a minimum of expense. It is as effective here as it is for all other paper mill cleaning, from washing felts and wires to removing heavy dirt and grease from machinery in the engine room.

Call in our nearby Service Man and let him wash a few windows for you the Oakite way—or help with any other cleaning job you may have. A card to us will do.

Oakite materials are manufactured only by
OAKITE PRODUCTS, INC., 16A Thames St., NEW YORK, N. Y.

Oakite Service Men, cleaning specialists, are located at

Albany, N. Y., Allentown, Pa., Altoona, Pa., *Atlanta, Baltimore, *Birmingham, Ala., *Boston, Bridgeport, *Brooklyn, N. Y., Buffalo, *Camden, N. J., Canton, O., Charlotte, N. C., Chattanooga, Tenn., *Chicago, *Cincinnati, *Cleveland, *Columbus, O., *Dallas, *Davenport, *Dayton, O., Decatur, Ill., *Denver, *Des Moines, *Detroit, Erie, Pa., Fall River, Mass., Flint, Mich., Fresno, Cal., *Grand Rapids, Mich., Greenville, S. C., Harrisburg, Pa., Hartford, *Houston, Tex., *Indianapolis, *Jacksonville, Fla., *Kansas City, Mo., *Los Angeles, Louisville, Ky., Madison, Wis., *Memphis, Tenn., *Milwaukee, *Minneapolis, *Moline, Ill., *Montreal, Newark, N. J., Newburgh, N. Y., New Haven, *New York, *Oakland, Cal., *Omaha, Neb., Oshkosh, Wis., *Philadelphia, *Pittsburgh, Portland, Me., *Portland, Ore., Poughkeepsie, N. Y., Providence, Richmond, Va., Reading, Pa., *Rochester, N. Y., Rockford, Ill., *Rock Island, *San Francisco, *Seattle, *St. Louis, *St. Paul, South Bend, Ind., Springfield, Mass., Syracuse, N. Y., *Toledo, *Toronto, Trenton, *Tulsa, Okla., Utica, N. Y., *Vancouver, B. C., Williamsport, Pa., Worcester, Mass.

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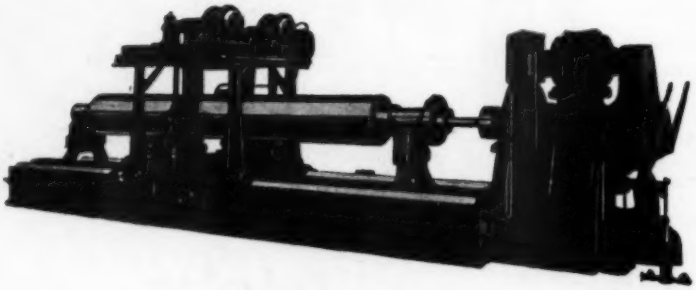

A new model with enclosed geared driving head and full automatic lubrication including the Vs. and the feed-screw.

RAPID
ACCURATE
LONG-LIVED

The automatic crowning device and the provision for leveling the bed are exclusive features of the Lobdell Roll Grinders.

LOBDELL CAR WHEEL COMPANY

Established 1836

WILMINGTON, DELAWARE

BARRE GRANITE IN PRESS ROLLS

Is Revolutionizing the Whole Paper Making Industry

If your Paper Machines are not equipped with Press Rolls of BARRE GRANITE you are not getting the results that you should get, for it is a recognized fact that granite rolls are much superior to any others and Barre Granite the best of all. Let us tell you about them.

Jones Brothers Company

BARRE, VT. **BOSTON, MASS.**

Forest Products Co. for power purposes. By harnessing the river through the erection of a large dam the company will obtain sufficient power to operate one of the largest pulp and paper mills in Canada on the east coast of the Island, near the mouth of the Nimpkish. A license allowing the use of the river for power purposes has already been issued to the company, and a further license covering the storage of water in Nimpkish Lake will be issued. This will enable the company to proceed with its pulp and paper scheme, which is backed by the International Harvester interests of Chicago.

Owing to the fact that the Crown Willamette Paper Co. controls the Pacific Mills, Ltd., of Ocean Falls, through ownership of 66 per cent of the common shares, and also due to the large investment by Canadians in the securities of the Crown Willamette Paper Co., considerable interest was awakened in Canadian paper circles by the news from San Francisco that the Crown Willamette Paper Co. and the Zellerbach Corporation have consolidated to form the Crown Zellerbach Corporation, with assets of nearly $100,000,000 and a daily capacity of 1450 tons of finished paper.

NORTHERN NEW YORK NEWS

Thaddeus C. Sweet

Representative Thaddeus C. Sweet, owner of the Sweet Brothers Paper Co. of Phoenix, was instantly killed in an airplane accident near Cortland, N. Y., on the afternoon of May 1. Mr. Sweet was flying from Washington to Oswego to attend a banquet in a plane piloted by an army aviator. A forced landing was made during a storm and the plane tipped over, crushing Mr. Sweet.

Mr. Sweet was born in Phoenix Nov. 16, 1872. In 1895 with his brother K. N. Sweet, he organized a paper manufacturing business in Phoenix under the name of Sweet Brothers Paper Manufacturing company with which he was connected at the time of his death. The business was started in a very small way. The two brothers ran their own machine, one working nights and the other days in order to keep up the product of their plant. The one who worked nights took charge of the business end of the concern in the day time. The small mill did not have sufficient production to compete with other mills, so Mr. Sweet turned to the making of specialties and built a new mill, at the same time buying out his brother's interest. His son, Richard W. Sweet, was associated with his father in the business and was secretary of the corporation and operating manager.

Mr. Sweet was elected to the New York state legislature in 1909 and in 1913 he was elected speaker of the assembly after a protracted contest. He held this post until 1920 when he voluntarily retired from the legislature. In 1924 he was elected representative in congress to succeed the late Representative Luther W. Mott. Because of his experience in the paper business he was given a place on the important ways and means committee, which post he held at the time of his death.

Manley M. DeWitt

Manley M. DeWitt, president of the Waterbury Felt Company, Skaneateles Falls, N. Y., passed away at his home in Mottville, N. Y., May 1, after a short illness

Mr. DeWitt was born in Oakhill, N. Y., April 16, 1868. At an early age he was employed by H. Waterbury & Sons Co., Oriskany, as a salesman. He left that company to make a connection as salesman with the Waterbury Felt Co., and eighteen years ago was made president and general manager of the company. Mr. DeWitt was widely known to the paper industry and his passing came as a shock to many friends and acquaintances.

Surviving Mr. DeWitt are a wife and son, two sisters and one brother.

The schedule of wages and the working rules to prevail in the St. Regis paper mills during the next year will remain unchanged. The annual wage conference between of-

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WALDRON
Complete
FACTORY LAYOUTS

Present day competition in processing and production calls for the utmost efficiency in the designing, fabricating and installation of the Factory Layout. This assurance of profitable production is best provided through the services of Waldron engineers, backed by a century's wealth of knowledge and experience in this work, that is unequalled by that of any other organization in the field. Consulting us regarding your present or future requirements puts you under no obligation.

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THE NINTH ANNUAL CONVENTION
of the
AMERICAN PULP AND PAPER MILL SUPERINTENDENTS ASSOCIATION
Is To Be Held At
PITTSFIELD, MASS.
MAY 31st, JUNE 1st and 2nd

IN THE BERKSHIRE HILLS—One of the Papermaking and Industrial centers of America.

It was in the Berkshires that the first wood pulp was made in this country. In the Berkshires stands the mill where the first paper was made in America from wood pulp.
Here, too, are the famous **CRANE MILLS**, where the paper for the United States Government money and bonds, and for foreign countries as well, has for years been made.

A drive through the Berkshires is like a drive through fairyland—scenic grandeur everywhere.
The big plant of the **GENERAL ELECTRIC COMPANY** is located at **PITTSFIELD**, and is well worth seeing.
The **E. D. JONES & SONS COMPANY**, makers of machinery for pulp and paper mills, is in **PITTSFIELD** and bids you a real welcome as do all the concerns in the Berkshires.

At Lee, just a few miles from **PITTSFIELD**, are the mills of the **SMITH PAPER COMPANY**, one of which was the first to use wood pulp in the country for making paper.

In addition to the **CRANE MILLS** at Dalton, are the **BYRON WESTON MILLS**, and in **HOUSATONIC** is the **B. D. RISING PAPER COMPANY**, while at Adams, a short distance away, is the **BERKSHIRE HILLS PAPER COMPANY**, and the **L. L. BROWN PAPER COMPANY**.

IN SOMETHING LIKE AN HOUR'S DRIVE FROM PITTSFIELD, YOU WILL SEE ABOUT FIFTY PAPER MILLS—and they all extend a cordial invitation and welcome to the Convention.

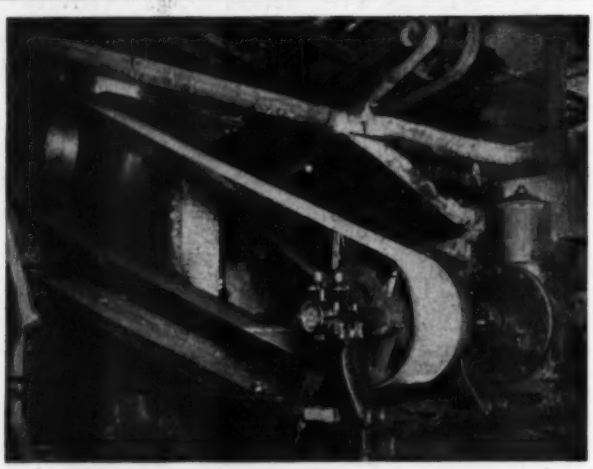
That is by no means all. There will be speakers at the convention who will talk on subjects nearest the heart of the **PAPER MILL SUPERINTENDENT**—it will be three days of highly interesting and instructive experiences.

SO COME ALL YE FAITHFUL and ye who may not have been so faithful, and help make this Ninth Annual Convention the best ever.

AND THE LADIES—bring them with you and they will have a time that will linger long in their memories—we'll see to that.

ALL TOGETHER FOR A MOST WONDERFUL CONVENTION.

JOHN J. WHITE
GENERAL CHAIRMAN



Another Pacemaker Performance

THE CINCINNATI RUBBER MFG. CO.
Cincinnati, Ohio

It Saved 33⅓% in Belting Cost

Pacemaker belting has been installed in the plant of the Mt. Vernon Straw Board Company, Mt. Vernon, Indiana, as standard equipment.

Pacemaker effected a saving of 33⅓% in belt cost per ton of paper produced. The illustration shows a 14-inch, 8 ply Pacemaker belt driving a Jordan transmitting 150 H.P. from the beater room line shaft.

Wherever you use belting, Pacemaker is an economical connecting link between power and production.

ficials of the company and the representative of the unions was held in Watertown. No friction developed at the meeting and the agreement contains the provision that a 30-day notice must be given by either company prior to any determination to terminate the agreement.

Arrangements have been made for the shipment by barge canal of from 18,000 to 20,000 tons of pulpwood to the Oswego Falls Corporation. This wood will come from Nova Scotia and Newfoundland. The barge canal shipments will be made to determine whether the St. Lawrence River or the barge canal offers the best waterway. The Atlantic routing takes the wood down the Atlantic Coast to New York, thence up the Hudson by barge and to Fulton by the barge canal. A representative of a shipping company said that if proper arrangements could be made for storage, a fleet of motor ships would be put on the St. Lawrence and Oswego would be made a point of distribution by rail.

Joseph Richmyre and Harold Brotherton were badly hurt while employed in the Algonquin plant at Ogdensburg, Richmyre subsequently dying of his injuries. They were injured when a door of a digester blew open.

There will be an increased output of union watermarked papers at the Union mill at Potsdam. Arrangements have been made with the publishers of about 15 of the union publications in the United States to use only union watermarked papers. It is expected that about 100 tons of this paper will be the increase at the Potsdam mill each month.

The pulpwood season at Ogdensburg started last week when the first boat from down the river arrived. Between 80,000 and 90,000 cords of wood will be received during the season for the Algonquin and Pyrites mills.

New Taggart Mill Now Running

The papermaking department of the new Taggart plant in Oswego is now running on a 24-hour daily basis. The 168-inch fourdrinier high speed machine was put in operation during the last week in April. The auxiliary machinery consists of 14 beaters, one shredder, stock chests and pumps. The fourdrinier machine has a capacity of 100 tons of kraft paper daily and it will go into the Taggart multi-wall bags. For several months the bag factory has been running with kraft paper made by the St. Regis Co. The papermaking department will employ a force of 75 men. A large number of bag orders have been booked.

The board mill owned by the Oswego Board Corporation has also started with a capacity of 70 tons a day. This will be marketed by the Johns-Manville Co., and will be known as Johns-Manville insulating lumber.

John A. Dix

John Alden Dix, former governor of New York, and a well-known paper manufacturer of Northern New York, died April 9, after a long illness. He was 67 years old and served as governor of New York from 1910 to 1912.

For many years Mr. Dix was the controlling factor in the Iroquois Paper Co., owning a mill at Glens Falls. He was associated with Winfield A. Huppuch in this enterprise. Prior to this he was associated with his father-in-law, Lemuel Thompson in the United Boxboard Co. at Thompson near Glens Falls. He had been a director of the Moose River Lumber Co. of McKeever, and the Standard Wall Paper Co. of Hudson Falls. He was interested in lumber companies in Herkimer County which furnished a large amount of pulpwood to paper manufacturers.

Charles W. Valentine, president of the Bagley & Sewall Company, has invented an improved dryer mechanism for papermaking, on which he has been granted a patent which has been assigned to the Bagley & Sewall Co.

An increase averaging two cents an hour for beater engineers, head shredder men, head loaders, loaders and oilers in the mills of the Union Bag and Paper company at Hudson Falls, is provided in a joint agreement made with the corporation and the Brotherhood of Pulp, Sulphite and Paper

RYERSON

Immediate Shipment from Stock

Bars, Shapes, Structurals, Rails, Plates, Sheets, Rivets, Bolts, Nails, Wire, Chain, Turnbuckles, Shafting, Boiler Tubes, Boiler Fittings, Corrugated Sheets, Concrete Reinforcing, Welding Rods, Babbitt Metal, Tool Steel, Bar Iron, Refined Iron, Floor Plates, Safety Treads, Small Tools, Machine Tools, etc.

Write for the Journal and Stock List—the "key" to Immediate Steel.

JOSEPH T. RYERSON & SON INC.

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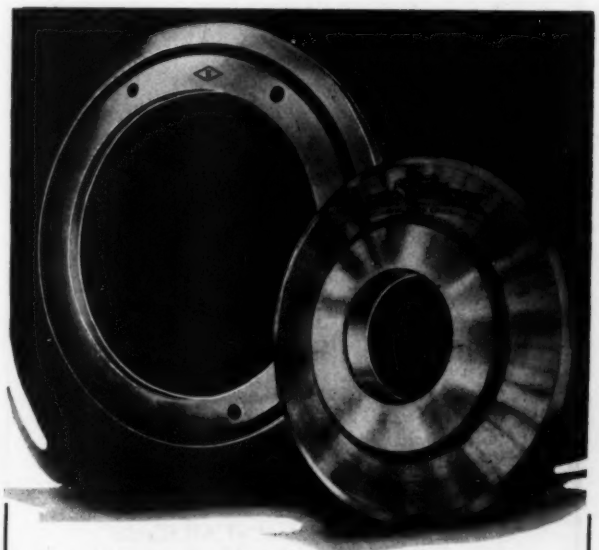
STEEL



Simonds Circular Paper Slitters

Edge-holding—that explains why mills in every section are turning to SIMONDS for the Circular Slitters that give them better work and more production. Simonds Slitters are true to form and perfect mechanically.

Order them from any Simonds factory or service station.

Simonds Saw and Steel Company

ESTABLISHED 1832—FITCHBURG, MASS.

Chicago, Ill. Boston, Mass. Detroit, Mich. New York City
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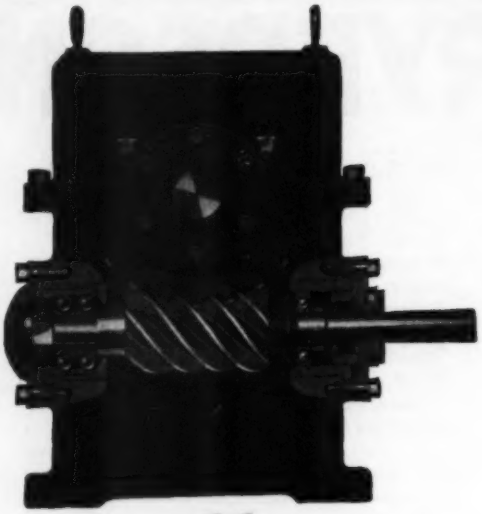
San Francisco, Cal. Los Angeles, Cal. Seattle, Wash. Montreal, Que.
Toronto, Ont. Vancouver, B. C. St. John, N. B.



DRIVE IT WITH GEARS

WORM GEAR SPEED REDUCERS

Run silently, have a long life and do not slip, stretch or get out of pitch. They operate in abrasive dust and under extremes of temperature. Whether it is at right angles, straight through, or parallel shafts there is a Horsburgh & Scott gear drive to suit your needs.

The Horsburgh & Scott Co.

"Gear Makers Since '89"

5114 Hamilton Ave. **Cleveland, U. S. A.**

Gears for Every Industrial Purpose—Worm—Bevel—Herringbone—Spur—Spiral—Hardened Heat Treated Gears —Non Metallic Gears and Pinions

"Cleveland Type" Oil Film Bearings

"Smith Type" Hill Friction Clutches

"Industrial Type" Spur Gear Speed Transformers

There's a Reason Why
the Pulp and Paper Mill Industry Use

"Hill Clutch" Mill Equipment

featuring

"Smith Type" Hill Friction Clutches
"Cleveland Type" Oil Film Bearings
"Industrial Type" Spur Gear Speed Transformers
"Steelarm" Automatic Belt Tighteners
Agitator Equipment of All Kinds
Flexible Couplings

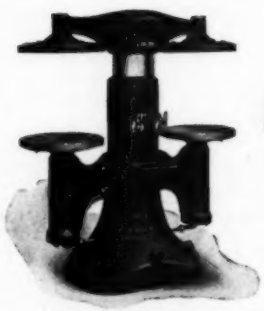
Your wants mean more to us than "so much material." A careful study is made by Engineering Experts skilled in Power Transmission problems. You receive the accumulated experience of "half a century" serving the Pulp and Paper Mill Industry.

The Hill Clutch Machine & Foundry Co.

Power Transmission Engineers

General Office and Plant
Cleveland, Ohio

H·S MACHINE CO.



DOUBLE PNEUMATIC PACKAGE PRESS

Upper plattens adjustable. Both upper and lower plattens 20 in. in diameter and can be turned at will by operator. An ideal press for all purposes. Other designs and sizes. See our catalogue for special equipment for paper manufacturer and converter.

Hudson-Sharp Machine Co.
GREEN BAY, WISCONSIN
Chicago Office: 574 Wrigley Bldg.

Mill workers and the International Brotherhood of Paper Makers. The agreement will remain in effect until May 1, 1923. About a score of wage conferences will be held in this country and in Canada during the spring.

Hollis Martin

Hollis Martin, aged 45 years, president of the Martin Pulp and Paper Co., owning a paper mill at Yaleville, near Norwood, was instantly killed when his automobile was struck by a train near Norwood, April 15. His daughter, Marian, aged 16, and a niece, Miss Florence Martin, 28, of Syracuse, the other two occupants of the car, were also instantly killed.

Mr. Martin had recently been elected mayor of the village of Norwood. He was associated with his brother, Arthur Martin, in the operation of the paper mill.

The Whiting Paper Co., Holyoke, Mass., is rapidly progressing in changing over the Lyman Mills recently purchased for the manufacture of paper. The buildings are being remodeled and most of the equipment has been contracted for. Four motor driven web supercalenders and a three million gallon gravity filter plant of the latest type have been ordered from the Norwood Engineering Company of Florence, Mass.

The Degrasse Paper Co., which formerly owned a mill at Pyrites, has been dissolved according to a certificate filed with the Secretary of State. The mill was acquired by the International Paper Co. several months ago.

NEW YORK CITY NEWS

International Earnings Make Big Gain

The International Paper Co. and subsidiary companies report gross earnings for the year ended December 31, 1927, of $15,529,859, which shows a large increase compared with the earnings of $10,074,251 in the preceding year. The cost of sales expenses decreased from $50,103,082 in 1926 to $49,886,276 last year, while net revenue available for dividends, after dividends on subsidiary preferred stock, amounted to $5,736,499, as against $3,275,283 in 1926. Earnings after prior dividends last year were equivalent to about $2 a share on the 1,000,000 shares of common stock outstanding or subscribed for at the end of the year. Surplus for the year aggregated $49,588, comparing with $326,812 in the preceding year, while total surplus at the end of 1927 amounted to $22,648,543, against $22,258,080 the year before.

Archibald R. Graustein, president of the company, in his report to stockholders said the expansion of the company in the last few years had not only provided a substantial degree of diversification, particularly by its development in the power field, but had also entrenched it more firmly in the pulp and paper industry, both in respect to lower costs of production and permanence of supply of pulp wood. Though newsprint still remains the largest division of the company's pulp and paper business, it has also become a large producer of kraft papers, of bleached sulphite pulp, and of book and bond papers.

Messrs. Elsas and Kuhe Retire

Herman Elsas, president and general manager, and I. Kuhe, vice president and manager of sales of the Continental Paper and Bag Mills Corp., with principal offices in New York City, have resigned from active service in that company, according to announcement. Mr. Kuhe also resigned as president of the Victory Bag and Paper Co. Messrs. Elsas and Kuhe had been connected with the Continental since the company was organized on May 23, 1899; in fact, they, with the late Hugh J. Chisholm, were the organizers of the concern, which originally was known as the Continental Paper Bag Co. The first plant of the company was in Rumford, Me., adjoining the International Paper Company's paper mill there, and

TIMKEN
Tapered
ROLLER BEARINGS

LEWELLEN was—

FIRST with Complete Ball Bearing Equipment

FIRST with Remote Control

FIRST with Electric Speed Indicator

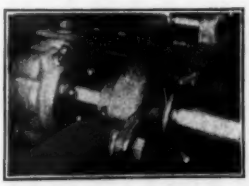
FIRST with Automatic Control

Now—

we take pleasure in announcing the Lewellen Variable Speed Transmission, equipped with Timken Tapered Roller Bearings throughout.

Write for further information. Just a card will bring complete details

TIMKEN Thrust → Bearing



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LEWELLEN MFG. CO.

Columbus, Indiana

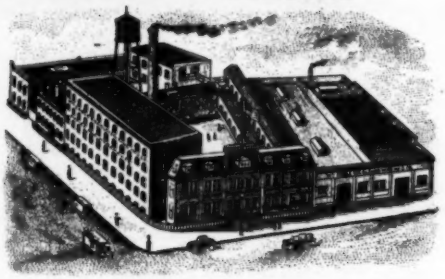
LEWELLEN Variable Speed TRANSMISSION

THE WM. CABBLE EXCELSIOR WIRE MANF'G CO.

MANUFACTURERS OF

Brass and Bronze Backing Wires
Cylinder Faces & Washer Wires
Red Brass Brush Wire
Top Brass Manufacturers.

SUPERIOR FOURDRINIER WIRES



For 80 Years we have specialized in the manufacture of brass Fourdrinier Wires, Cylinder Covers, Washer Wires and Save-all Wires as well as Phosphor Bronze Fourdrinier Wires and Cylinder Covers.

Established 1848

Offices and Warehouses:

74-88 Ainslie St.
143-151-163 Union Ave.
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BROOKLYN,
NEW YORK

If you "do choose to run" That's your GAIN
If you "don't choose to run" That's your LOSS

REFERRING OF COURSE TO RUNNING **"TENAX" Felts**

TENAX

Means STRENGTH
DURABILITY
SERVICE

NONUSERS ARE THE LOSERS

"TENAX" Felts FOR ALL PURPOSES

MADE ONLY BY

LOCKPORT FELT CO.

NEWFANE, N. Y.

under the able guidance and management of these men the company quickly achieved a foremost position in the paper bag manufacturing field. Later other plants were built or acquired until the capacity of the company's mills reached more than 500 tons of paper products daily.

Both Messrs. Elsas and Kuhe have taken prominent roles in trade association work and have served on the Executive Committee of the American Paper and Pulp Association. In retiring from the Continental, they leave to their successors in the management a business of between nineteen and twenty millions of dollars yearly and an excellent organization which enjoys the good will of the trade to a striking degree.

Paper District Centers at Grand Central Station

The New York papermaking district continues to move uptown. There was a time not so very long ago when Forty-first street from Fifth avenue to Park Avenue was considered the ultimate limit for offices of pulp and paper manufacturers. The American Paper and Pulp Association and the New York office of THE PAPER INDUSTRY are conveniently located on this street just east of Fifth avenue. At the intersection of Forty-first street and Park avenue is the Pershing Square Building which houses the International Paper Company, Continental Paper and Bag Mills Corporation and several other paper manufacturing firms. East Forty-second street and the spur thoroughfares like Vanderbilt avenue bordering on the Grand Central Terminal have always been favorite office districts both for manufacturers and merchants of paper. The offices of the News Print Service Bureau and the Waxed Paper Association are in the Canadian Pacific Building at Forty-third street and Madison avenue, a building which also houses several New York City representatives of out-of-town paper firms. But the latest move uptown is to the New York Central Building, an immense tall structure that is nearing completion immediately north of the Grand Central station at Park avenue and Forty-fifth street. There is to be an exodus of paper manufacturers from the Fifth Avenue Building at Twenty-third street and Fifth avenue to the New York Central Building in May, 1929, among the firms which will move there next year being the West Virginia Pulp and Paper Company, New York and Pennsylvania Company, and the Oxford Company, all of which have taken 10-year leases of space. The Mead Sales Company will also occupy space in the New York Central Building, the lease being already signed. Ellen & Jeffrey, of 33 West Forty-second street, who are office specialists in the Forty-second street district, were the brokers who negotiated these important leases.

In line with the foregoing movements, it is of interest to note that the Kimberly-Clark Company has signed a 21-year lease for the entire seventh floor of the 56-story Chanin Building, facing the Grand Central station at Forty-second street and Lexington avenue.

M. Gottesman & Company Move

M. Gottesman & Co., Inc., wood pulp merchants who have been located at 18 East Forty-first St., New York, for 15 years, moved on April 30 to new and larger quarters in the Central National Bank Building, Broadway at Fortieth street. D. S. Gottesman, president of the company, is also chairman of the Board of the Central National Bank and president of the Central National Corporation, both of which are located in the Central National Bank Bldg.

M. Gottesman & Co., Inc., were established in 1886 and for over 40 years have been specializing in wood pulp and chemicals for the paper and pulp industry. They maintain their own offices at Kungstradgardsgatan 10, Stockholm, Sweden, for closer contact with the Scandinavian and Continental markets in which they do a comprehensive business.

The Miller & Wright Paper Co., Inc., among the leading paper merchandising concerns in New York City, which has had its offices and warehouse at Duane and Elm Sts., in the city hall district of the metropolis for several decades, has leased the major portion of the ground floor and the second

THE PAPER INDUSTRY IS MOVING UPTOWN

Our Organization Has Leased Space to

THE N. Y. and PENNSYLVANIA CO.

THE WEST VIRGINIA PULP AND PAPER CO.

THE OXFORD PAPER CO.

We Are Specialists in office space in the uptown district

CONSULT US AND GET THE BEST SERVICE

No Charge

ELLEN & JEFFERY
REAL ESTATE
33 W. 42nd St. Longacre 8143-4
NEW YORK

Our Selling Problems Would Be Solved

If we could induce you to give our High Quality Fourdrinier Wires a trial. Their performance would justify all the good things we have said about them. The language they would speak on your paper making machine would be far more convincing and eloquent than any salesman's talk could be.

When you solve our selling problem, you will solve your wire problem.

High Quality is the dominant feature of our Wire Cloth, Cylinder Moulds and Dandy Rolls.

CHENEY BIGELOW WIRE WORKS

Established 1842 Springfield, Mass.

THE DRAPER FELT

Unexcelled for strength, openness, resiliency, and general running qualities. Made to meet the most exacting conditions on all types of machines and all kinds of papers. Only one grade and that the highest.

Made by

DRAPER BROTHERS COMPANY

CANTON, MASS.

Woolen Manufacturers Since 1856

REPRESENTATIVES

L. H. BREYFOGLE, Kalamazoo, Mich. INTERNATIONAL TRADING CO., Philadelphia, Pa.

PACIFIC SALES COMPANY, Security Bldg., Portland, Ore.

floor of the Graphic Arts Center Building on the lower West Side of New York, and will shortly move to the new location. The rental for the term of the lease aggregates over $500,000. The firm was established in 1895 under the name of Miller, Sloan & Wright, and has been in its present quarters for over 33 years.

The Champion Coated Paper Co., of Hamilton, O., announces the appointment of George S. Johnston as manager of its New York City office at 2 Lafayette street. Through 20 years of experience as general sales manager of the Western Newspaper Union, operating 11 divisional warehouses selling book and coated papers, Mr. Johnston has acquired an exceptional experience in the sale of Champion products which enables him to bring to the New York district every assurance of personal assistance and co-operation. John P. Osborne, who has been with the New York office for several years, will continue his association with the company in a more comprehensive service.

Fred L. Schenk has severed his connection with C. B. Hewitt & Bros., Inc., board and paper dealers, and is now with the Walker Goulard Plehn Co., Inc., mill distributors of paper at 450 Pearl St., New York, in charge of the board and specialties department. Mr. Schenk has had more than 25 years' experience in selling pattern papers, rope specialties and boards. The Walker Goulard Plehn Co. is the successor of the old firm of Maurice O'Meara Co.

The St. Regis Paper Co., of Watertown, N. Y., has removed its New York City office from 49 Wall street to the new Equitable Trust Company Building at 15 Broad St., where larger quarters are occupied.

The West Virginia Pulp and Paper Co., whose main offices have been located for a good many years in the Fifth Avenue Building, 200 Fifth Ave., New York, has leased space on the thirteenth floor of the new New York Central Building at Park Ave. and Forty-fifth St., and will move to its new quarters when the building is completed.

The New York and Pennsylvania Co., manufacturer of pulp and paper, with offices now at 200 Fifth Ave., New York, also has leased new quarters in the New York Central Building, and will move to the new location when the building is ready for occupancy.

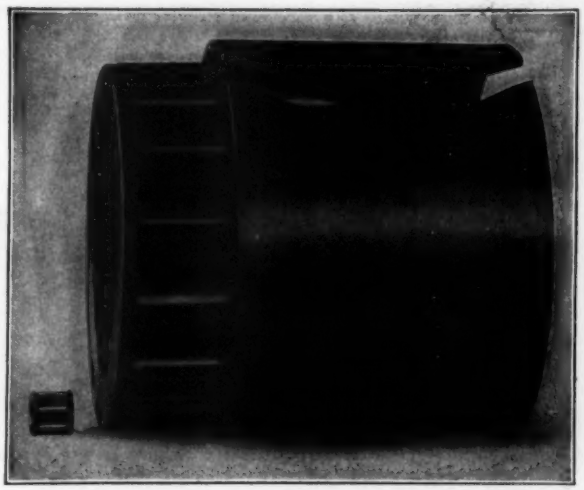
Pulp Bleaching Corporation, formerly at 39 Cortlandt Street, New York, on May 1 removed to the Fifth Avenue Building, 300 Fifth avenue, New York. This corporation manufactures Fletcher, Colline-Moore & White and Wolf type machines for bleaching pulps by the Wolf thick stock bleacning process.

New Rogers Knife Grinder

A machine especially designed for grinding barker, chipper and paper knives, known as the new Type "R" sectional wheel knife grinder, has been announced by Samuel C. Rogers & Co., Buffalo, N. Y., as an addition to their line of automatic knife grinders and saw sharpeners.

The machine is equipped with a new 14 inch sectional grinding wheel having eight segments mounted in a strong steel chuck with simple adjustment for holding and replacing segments. The sectional grinding wheel permits much faster knife grinding than the solid wheel type because the spaces between the grinding sections form channels for carrying away the abrasive particles and the stock ground off the knife, and allows free entrance of the coolant to the actual grinding contact, which both carries away the heat generated and aids in washing away the refuse. In addition, there is economy of abrasive, as the sections can be replaced cheaper than solid wheels.

All sizes are equipped with an improved water attachment; heavy yoke adjustable bottom supports to eliminate vibration; double ratchet feeding with automatic stop; increased speed (ball bearing if desired) direct motor drive with 5 h.p., 60 cycle motor with starter; extended shaft, brackets, etc.; belt



This illustration shows comparative size of the largest and smallest bearings listed in our new catalog of Wide Series and Utility Type Bearings

Roller Bearings
for the rough jobs

In addition to the precision types of Rollway radial and thrust bearings, which are giving satisfactory service in the hardest and heaviest jobs in industry, there are a number of other types of Rollway bearings designed for the numerous applications where the operating conditions will not justify the cost of the precision-type bearing.

These less costly types are known as Wide Series and Utility Types, and are described in our new 16-page Catalog No. 4-A. When properly applied in the service for which we recommend them, these bearings will give the same satisfactory results that have established the reputation of the more expensive types of

ROLLWAY CYLINDRICAL ROLLER BEARINGS

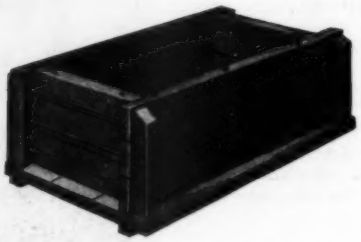
Wide Series and Utility Bearings are listed in seven types and in 168 different sizes. They have behind them more than 18 years of engineering and manufacturing experience, and in many cases will give satisfactory results at a small fraction of the cost of precision type bearings.

Ask for your copy of Catalog 4-A or submit your problem to our engineers. If the less expensive types will meet your needs, you may be sure that we will not recommend the more expensive types.

Rollway Bearing Co., Inc.
Syracuse New York

STEARNS TANKS

BOX TANKS
ROUND TANKS
HALF ROUND TANKS



ACID TOWERS
STUFF CHESTS
STAVE PIPE

If it is a wood tank of any shape or design we can make it for you. Our engineering department is ready to assist and advise you.

The A. T. Stearns Lumber Co.
Neponset, Boston, Mass.

EVERYTHING IN WOOD OR WOODWORK 1849

STEARNS TANKS

CMC

Manufacturer of

PAPERMAKERS' ALUM

for 42 years

MERRIMAC CHEMICAL COMPANY

Commercial Alum
Iron Free Alum
Salt Cake
Bisulphite of Soda

BOSTON, MASS.

NO FELT MARKS—
With Fitchburg Felts

THE smooth, tightly-woven surface of all Fitchburg Cotton Dryer Felts insures paper free from felt marks.

¶ The finest papers—bonds, ledgers, fine writing—are made better and smoother when Fitchburg Felts are used.

¶ Manufactured in English weave, two, three, four, five and six ply, from 60 to 210 inches in width.

FITCHBURG DUCK MILLS
ESTABLISHED 1844
54 Duck Mill Road FITCHBURG, MASS.

drive with tight and loose pulleys 8 inches in diameter with 3½ inch face to run 1150 r.p.m.; leather belts; emery wheel dresser; wrenches, etc.

This new Type "R" machine will be made in eight different sizes—76", 84", 90", 96", 108", 120", 130" and 144".

NEW ENGLAND NEWS

Massachusetts Safety Council

The Seventh Annual State Conference of the Massachusetts Safety Council, which met at the Statler Hotel, Boston, April 30 and May 1 was well attended. Delegations were present from every New England state, New York, and as far west as Chicago. Lewis E. McBrayne is permanent secretary and general manager of the Council with offices at 89 Beacon Street, Boston, from which a constant stream of literature emanates for use of industry in accident prevention. Use of its facilities was urged upon manufacturers.

The first day was devoted to a discussion of industrial safety; the second day to highway safety.

Safety in the Small Plant

One of the outstanding addresses was that of Lewis DeBlois, director, Safety Engineering Division, National Bureau of Casualty and Surety Underwriters, New York, and former president National Safety Council. Mr. DeBlois' subject was "The Small Plant—Our Unsolved Industrial Problem." The speaker made the statement that the safety movement is yet in its second stage. Its vitality is immense, but there is yet the task of lifting it out of the faddist specialist class to the plane of serious executive attention. It still retains much of the awkwardness and incongruity of youth. It was pointed out that 90 per cent of the manufacturing establishments with 30 per cent of all manufacturing employment, employ on the average less than 100 persons. It is here that accidental death and injury have received the least attention.

Chemical Hazards

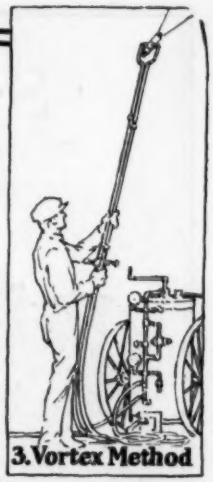
Professor Warren K. Lewis, Chemical Engineering Department, Massachusetts Institute of Technology, Cambridge, Mass., spoke on "Chemical Hazards in Industry." Recognition of chemical hazards by employers was emphatically urged. Such hazards are insidious and are not obviously recognized by the employee. The chemist is best fitted to advise on possible substitutes for processes and materials which present extra hazardous risks to health and life and for means of combating their virulence by proper adaptation of methods.

Employees with High Accident Record

Very interesting and instructive was the address by Dr. A. S. Slocumbe of the Personnel Research Federation of New York, who has been making an extended study of the accidents of the largest public service corporation in Massachusetts. Speaking on the subject, "The Problem of the Employee with a High Accident Record," Dr. Slocumbe brought out that safety work in street railway companies has one advantage that does not obtain so much in industrial plants, namely, the fact that every accident no matter how small or whatever the nature, must be reported. This means that there are a large number of accident reports to deal with, and the more there are, the more chance there is of accurately finding out causes by statistical analysis and treatment.

High Accident Groups—An important factor which was early revealed in the investigation referred to was that a certain number of men seemed to have many more accidents than others, even though operating over the same routes and under approximately identical conditions. It followed, of course, that the groups having the largest number of accidents were to be first dealt with. Any occupation may be regarded as hazardous or non-hazardous, but whether hazardous or not accidents may be due to either a small number of employees who have a large number of accidents thus boosting the average, or the accidents may be spread pretty evenly among the employees. In the second case, the condition of the work

3 ways to PAINT



1. Brush 2. Ordinary Gun 3. Vortex Method

Have you overlooked the Quick Economical Way?

THERE are three kinds of large area painting—[1] brush painting, [2] gun painting, [3] Vortex painting.

The Vortex equipment excels the ordinary gun, just as much as such a gun excels the brush in speed and economy.

Vortex equipment is not sold. It is furnished without cost to users of Vortex paint.

Painting Equipment is Loaned

Vortex paint is fine paint, prepared for every variety of painting equipment. But we just naturally like to help solve your problem—to make it easy for the paint to get where you want it—on the wall. The coupon below is your key to better and more economical painting.

THE VORTEX MANUFACTURING COMPANY
1981 West 77th Street . . . . Cleveland, Ohio

Vorcolite

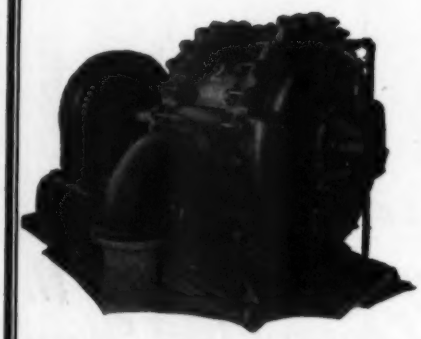
and the VORTEX PAINTING METHOD

Fill out and mail

VORTEX MFG. CO.
West 77th St., Cleveland, Ohio
Please send us check sheet to outline our painting problem. It is on new construction? _____ Buildings already in use? _____
Company .....
Address .....
Attention .....

V-33

Synchronous motor-driven!



Nash Hytor Vacuum Pump, direct connected to synchronous motor.

Nash Hytor Vacuum Pumps can be direct connected to synchronous motors. The revolving field of the motor is mounted on the same shaft as the pump impeller.

This construction provides four distinct benefits:

(1) It is more compact than belt drive.

(2) Also more efficient. Power transmission losses between motor and pump are avoided.

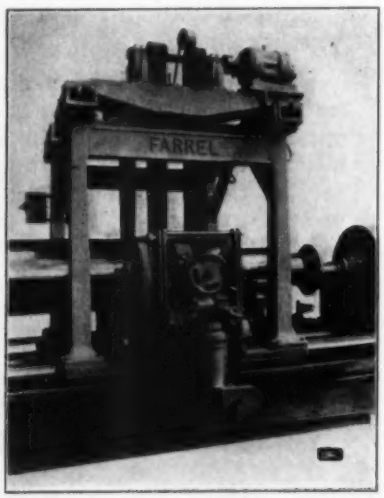
(3) There are no belts, no gears, no extra bearings to take care of.

(4) Sychronous motor drive is dependable.

Write us or our representatives for further information.

NASH ENGINEERING COMPANY
164 Wilson Road S. Norwalk, Conn.

Nash Hytor
VACUUM PUMPS AND COMPRESSORS



FARREL

FARREL NEW TYPE ROLL GRINDER is the only grinder made with combined SWING REST and CROWNING DEVICE, which makes for much more accurate and faster grinding. The combination is shown in the close-up at the left. The crowning device can be set in the minimum time and produces a perfect crown.

FARREL ROLL GRINDERS are made in 24", 32", 36" and 42" sizes, all electrically driven throughout and fitted with the combination Swing Rest and Crowning Device, Geared Head and Automatic Lubrication.

FARREL-BIRMINGHAM COMPANY INC.,

ANSONIA, CONN.

Successor to: { Farrel Foundry & Machine Co., Ansonia, Conn., Est. 1848.
Birmingham Iron Foundry, Derby, Conn., Est. 1836.

would be regarded as particularly hazardous. Safety work would then be devoted to improving the lighting or ventilation, putting up guards, etc., or safety organization.

Workers Prone to Accidents—It is quite possible to find out statistically, without detailed examination of records, whether or not there is present in any group of workers a percentage who are accident prone. It is only necessary to know the percentage who had no accidents during a period and the average number of accidents per employee. Curves based on the work of statisticians are then used for the purpose of telling whether there are accident prone men in a group. Assuming that there are high accident men and others with a general medium average, then employees can be split into two groups; 75 per cent having a comparatively low number each, say averaging 3, and 25 per cent having a high number of accidents each. The percentages might, of course, be 80 and 20, or 67 and 33, according to where the dividing line is put.

Reaching Conclusions—Work was started on the small group of high accident men for three reasons:

1—They seemed to be doing the best they could to avoid accidents and were fully as careful as the others. There was a general feeling that their accidents were just due to bad luck.

2—It seemed that the use of any general methods applying to all the men, such as introducing safety committees, bonus plans, etc., could not affect the high accident men.

3—The effect of the work on the 25 per cent is likely to spread the 75 per cent, but from the causes of their accidents there is little chance of work on the others affecting the 25 per cent.

It was decided to endeavor to get the 25 per cent high accident down to or below the average. In dealing with the high accident men, each was dealt with according to an individual method. In one-quarter of a year 90 per cent of the high accident men had been cured.

In many, if not all, industrial plants a large percentage of the accidents are due to a small percentage of employees who do not fit into their jobs. The safety man must look out for these, find out who they are, what is the matter with them and help to make them fit.

Connecticut Valley Supers Meet

The Connecticut Valley Division of the American Pulp and Paper Mill Superintendents' Association held a monthly meeting at the Hotel Nonotuck, Holyoke, Mass., on Saturday evening, April 28.

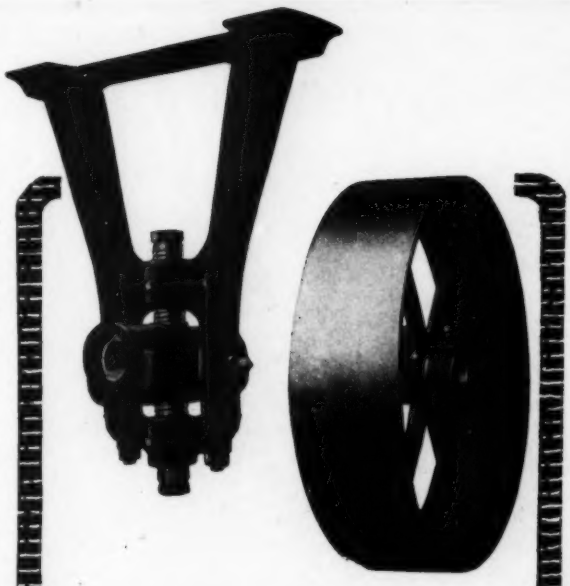
In place of the usual dinner and business sitting, the meeting took the form of a Smoke Talk which was well attended. The primary purpose was to present an opportunity to receive the new members, those men who have but recently joined the association and had not yet met the full membership requirements.

The meeting was called to order by Ed. J. McDonnell, chairman of the Board of Governors. Two new members, Ernest Bush, of the Crocker-McElwain Company and Hubert Des Marais, of the Chemical Paper Company, were admitted.

John J. White, chairman of the general committee for the annual convention of the association to be held in Pittsfield May 31, June 1 and 2, reported on the outline of the program for the convention, and the progress that had been made, and what the committee hoped for between now and the time of the convention. The division discussed the report thoroughly as outlined and expressed approval of the plans.

Then followed a lengthy discussion on several practical problems connected with manufacturing, which developed into an interesting and instructive session. It was voted to continue some of the questions brought up at the convention under the heading of Pot Pourri, which will occupy an important part of the Saturday morning program.

Doubling pulpwood imports through Portland, Hollingsworth & Whitney Co., of Gardiner and Waterville, Me., are apparently drawing on their extensive timberland holdings in the Canadian Provinces to a greater extent than ever. They have found Portland a satisfactory port at which to unload the wood where it is transferred by rail to their mills.



The T. B. Wood Sons Co. Line

of POWER TRANSMISSION MACHINERY is complete and efficient because it includes not only every article pertaining to the line, but also many different types of each article.

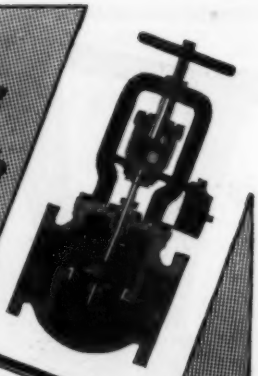
For example, we manufacture eighteen different types of Shaft Couplings, five types of Hangers, sixteen types of Pillow Blocks and so on throughout the whole line.

Only by making such a great varjety of different types of appliances can complete equipments be furnished that are balanced throughout, and where each unit is properly designed to perform its particular duty.

DRIVE RIGHT

T. B. Wood's Sons Co.
Chambersburg, Pa.
POWER-TRANSMISSION MACHINERY AND SPECIAL-MACHINERY

Steam can't back up through this valve



YOU are certain of a one way steam flow when Davis Stop and Check Valves protect the boilers. The serious accidents so frequently caused by a reverse steam flow when one of the boilers on the line lets down are positively prevented by this Automatic Davis Valve. Absolutely reliable in operation, it permits steam to flow from the boiler to the header, but closes instantly should the flow be reversed. The action is visible and may be hand tested quickly and conveniently.

It is simplicity of construction and design that has won Davis Valve Specialties a reputation for dependable service. Get the details in the Catalog.

G. M. DAVIS REGULATOR CO.
414 Milwaukee Avenue, Chicago, Illinois

P1-5-Gray

POWELL VALVES

Offer Service You Will Be Proud to Relate

Fig. 478
All Iron Pilot Gate Valve with outside screw stem

Every product, regardless of size or service recommendation, is accurately tested to limits greatly in excess of working pressures.

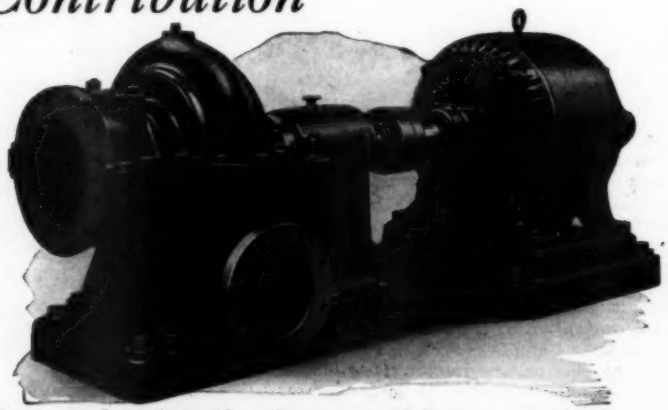
Powell Valves are made for nearly every service demand — water, steam, air, or gas, also special valves for handling pulp — sulphite and caustic liquors and acid solutions.

We manufacture a complete line of bronze, iron and steel globe, angle, cross, and check valves; also oilers, lubricators, grease cups, oil and water gauges, whistles, etc.

Dealers with stocks in all principal business centers.

THE WM. POWELL CO.
2521-2531 Spring Grove Ave.
CINCINNATI, OHIO

Allis-Chalmers Contribution to the successful handling of Paper Stock with better Efficiency



A New Paper Stock Pump, developed after working on this problem a long time until the pump met our ideas of what a good stock pump should be and do. The pumps will handle stock and are unusually efficient

ALLIS-CHALMERS
MILWAUKEE, WIS. U. S. A.

The approach to the Bancroft & Martin Rolling mill plant which is being used for the unloading operations has been dredged and permits easy access of larger draft vessels.

Cost accounting in paper mills was the title of an address given by Homer E. Sargent, auditor of the St. Croix Paper Co. before the Boston Chapter of National Association of Cost Accountants on April 26.

Freight Rates

The Eastern Class Rate adjustment proposing as it does radical adjustments of all freight rates within official classification territory aroused wide interest in the paper trade of New England which just at present has several major rate problems confronting it besides these tentative proposals. First study revealed the fact that the report of the I. C. C. examiner proposed 23 classes instead of 6 as at present. Where paper would land in such an adjustment would remain to be seen, but using a 30 per cent of first class relationship for sixth class rates, as paper moves sixth class within New England and from New England to trunk line territory, it was quickly found that advances were in store all along the line, advances that would affect most seriously some New England mills shipping to C. F. A. particularly the Chicago markets.

The New York and Boston rates of these mills would, of course, be increased, but leading competitors in New York State and Pennsylvania would fare the same, so relatively there would be little if any change. In shipping West, however, the suggestion is made in the report, that New England be permitted to retain her Canadian differentials to the West by which paper reaches Chicago at 1c per cwt. under the standard rail rate. New England mills are particularly interested in the relationship that would result from the application of a New York-Chicago base rate percentage to the Watertown group, important competitors of New England.

Meantime the Great Northern Paper Co., St. Croix Paper Co., Pejepscot Paper Co., and Gilman Paper Co., have filed complaints against the rates on newsprint paper to trunk line, and Southeastern territory, as well as to New England points which is taken to be an offset to the complaint of the Canadian mills and the International Paper Co.

To Open Big Pulp Lands

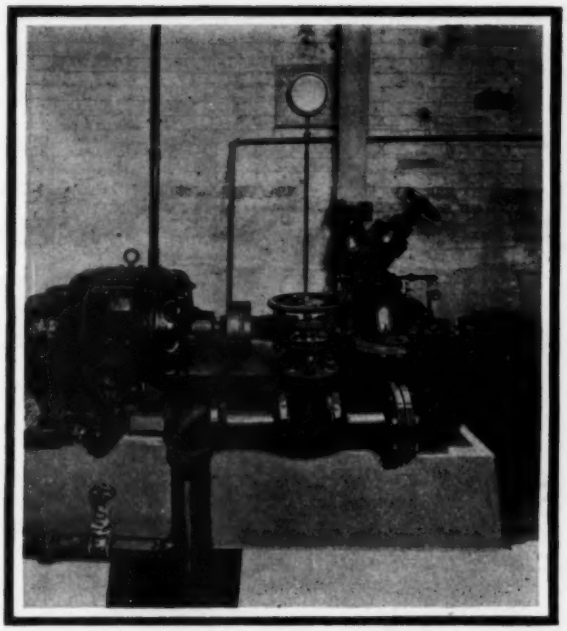
R. H. Wheeler of New York has acquired the interests of Senator Arthur W. Gould in the proposed Quebec Extension Railway which is projected across Northern Maine, and which was originally held up because of refusal of the International Paper Co., to grant certain stumpage options.

A 112 mile electric line is to be built between Presque Isle and Frontier Lake to cost four million dollars. The electrification was decided upon to reduce the fire hazard, as the land traversed will be almost entirely virgin timber growth. It will open to market 1,250,000 acres of virgin timberland, said to be the largest area of virgin woodland east of the Rocky Mountains. The International Paper Co. owns several hundred thousand acres of timberland in this area. Opposition to the proposed line which would merely link with the Canadian Pacific or the Canadian National with no apparent direct benefit to Maine, would be chiefly for the benefit of Niagara Falls mills it is said, and on that score keen opposition has been made to the project by several Maine mills not the least of which was the Great Northern Paper Co.

Henry J. Guild Buys Berkshire Plant

Henry J. Guild formerly an officer of the Eastern Manufacturing Co. has surprised the paper industry by the purchase at public auction of the Berkshire Hills Paper Co., of Adams, Mass., which has been operating in receivership for about eight months. W. H. Pritchard of the North Adams National Bank bid the property in for the account of Mr. Guild at $75,000. On the company's books it has been carried at about a million.

The Berkshire Hills Company though equipped with two machines, one for making bond and ledgers with supplementary equipment for the production of loose-leaf ledger,



American-Marsh Centrifugal Boiler-feed Pump, Watervliet Paper Co., Watervliet, Mich.

The Heart of Your System Must be Dependable

THERE can be no substitute for quality when it comes to your boiler-feed pump. It is the very heart of your power plant system. If the pump stops, the power stops.

We build our centrifugal boiler-feed pumps heavier than customary—heavier by quite a margin. This extra weight in every working part means extra strength—greater ability to endure the strains and stresses of continuous service, year after year.

If absolute dependability is a paramount issue with you, let's get together the next time you need pumps. The American-Marsh line is complete—single and multi-stage for low and high pressure—capacities for every operating condition. Write for specifications and performance ratings.

AMERICAN-MARSH PUMPS

Steam and Centrifugal
Boiler Feed
Vacuum
Condensation
Circulating
Booster
Fire
Stock Handling

AMERICAN-MARSH

AMERICAN STEAM PUMP COMPANY

BATTLE CREEK, MICHIGAN

PUMPING EQUIPMENT

BUILT FOR HARD WORK, LONG LIFE, AND NO WORRY TO THE OWNER

ZAREMBA EVAPORATORS

HAVE ESTABLISHED AN ENVIABLE REPUTATION

IN THE CONCENTRATION OF

SODA BLACK LIQUOR SULPHATE BLACK LIQUOR
SULPHITE WASTE LIQUOR

DUE TO
WIDE EXPERIENCE—THOROUGH ENGINEERING—PAINSTAKING CONSTRUCTION

ZAREMBA COMPANY
506 Crosby Bldg., Buffalo, N. Y.

New York City Office: 95 Liberty St.

If a flange fizzles pack with Jenkins

If a flange fizzles, pack with one of the Jenkins Packings, and *keep a record of the date.* This is one of the ways that many engineers have learned to standardize on the kinds of Jenkins Packings that meet the varied conditions of service in their plant.

Saturated steam is served by JENARCO or JENKINS '96, while high pressure superheated steam joint is best packed by COMPRESSED ASBESTOS JOINTINGS. OILTITE is used for oil service as the name indicates.

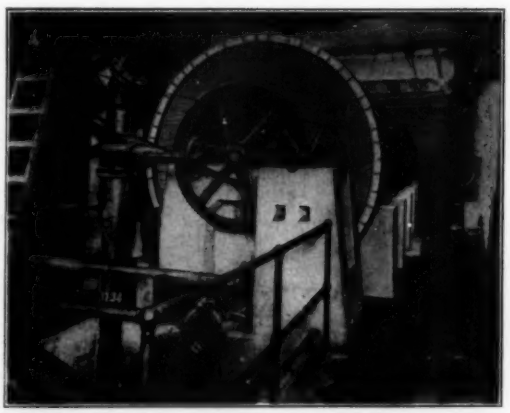
All Jenkins Packings may be supplied in sheets or ready cut gaskets. May we send you our packing and gasket folder?

Jenkins Packing include *JENARCO, a red packing for hot and cold water and saturated steam. JENKINS '96, a black packing for hot and cold water and saturated steam at all pressures, OILTITE, as its name implies for oil service, and COMPRESSED ASBESTOS JOINTINGS for high pressure superheated steam.*

JENKINS BROS.
80 White Street.....New York, N. Y.
524 Atlantic Avenue.....Boston, Mass.
133 No. Seventh Street..Philadelphia, Pa.
646 Washington Boulevard..Chicago, Ill.

JENKINS BROS. LIMITED
Montreal, Canada London, England

Always marked with the "Diamond"
Jenkins Valves
SINCE 1864



Paper Mill Tanks

The above installation in a well-known Ohio paper mill is only one of Hauser-Stander's successful installations.

Hauser-Stander has been building tanks for over fifty years and has particular knowledge of paper mill men's requirements.

The Hauser-Stander Tank Co.
CINCINNATI, OHIO

and another machine for light weights including tissues, manifolds, etc., has not operated the second machine in recent years. It is probable that the new owner will endeavor to obtain maximum production from the plant.

New beaters, dryers and other equipment are to be installed at the mills of Tileston & Hollingsworth Co., of Boston. Complete plans are now being prepared.

Shops of Rice Barton & Fales of Worcester, paper mill machinery manufacturers, are very busy on a number of important orders for fourdrinier machines.

Moosehead Paper Sues Insurance Company

Moosehead Paper Co., of Boston, is suing the Yorkshire Insurance Co., of York, England, with American agents at Boston for alleged non-payment on a $40,000 fire insurance policy.

The Moosehead Paper Co. was located at Skowhegan, Me., and during the year 1925 was largely destroyed by fire. Under the terms of the contract when no agreement as to loss could be arrived at, a committee of three was appointed which set the company's loss at $130,000. The policy was subject to the usual restrictions covering such matters under the laws of Maine. Suit was entered in the Superior Court of Massachusetts, Boston district, and later by act of the defendant transferred to the Federal District Court for the Boston jurisdiction.

The plaintiff is suing for $23,653 and interest of $2,559, though why the defendant is not liable for the face amount of the policy, or $40,000, does not appear.

A. Olafsen, president of the Waterfalls Paper Co., of Mechanic Falls, Me., has returned from a month's tour of the paper mills of the Pacific Coast. There was no intimation that his company, which is controlled in Sweden, contemplated any expansion on the coast or that his visit was for purposes other than general information on the progress of the industry. Mr. Olafsen expressed himself as convinced that the industry has an excellent future on the coast but felt sure that small fly-by-night ventures would be doomed to failure.

Central Fibre Co. to Make Milk Bottles

A new venture at South Gardiner, Me., in which the Keyes Fibre Co. is said to be interested through common directors in both companies is the Central Fibre Co., of the same city which purchased the building formerly occupied by the Pine Tree Pulp Co., of that place. The latter plant was purchased at auction by Julius Meyer, a Boston lawyer, who in turn disposed of it to the present interests which are headed by W. C. Cool, president, and R. D. Heymann, vice president.

The new company is manufacturing moulded milk bottles made from mechanical ground wood pulp. The new product has been highly recommended by medical experts on sanitary grounds and with the equipment at hand, it is proposed to eventually turn out 60,000 of these bottles daily. Some cities have adopted regulations making it compulsory to use single service containers instead of glass and this nucleus is giving a great impetus to the business. Crude oil bottles tested to 400 degrees F., and various moulded pulp toys are also to be produced.

S. D. Warren Co. to Expand

Representing an expenditure of a million dollars, the S. D. Warren Co. has completed the building of its new coating plant at Westbrook, Me. All work in connection with the construction was done by the Warren organization under the supervision of H. W. Grant, the company's chief mechanical engineer, with C. Omer Porter, superintendent of construction, and B. Clifford Cutter, chief draftsman. Machinery is to be installed at once, though it will probably be late in the year before operations will be possible. The mill was built with future needs in view. Coating machines from the other plants will be installed with one new machine,

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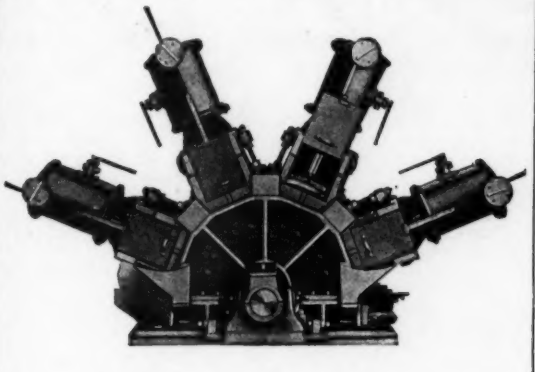

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Bearings very large—wedge adjustable.

Equipped with Barker valves which are designed so that they stay tight.

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and others will be added as business is found to warrant it.

This one new machine, however, will be among the largest in the world turning out a 90-inch coated sheet. This machine is also being built in the shops of the Warren Company. There will be a new 90-inch supercalender which has been purchased to be delivered about September 1. There are also two new 100-inch high speed cutters with a traveling crane for transporting paper from the calendars to the cutters. It is a product of the Hamblet Mfg. Co.

Direct connection with the Boston & Maine R. R. has been provided for in the new arrangements. The paper will be sorted on 16 new adjustable steel sorting tables and on 48 wooden tables.

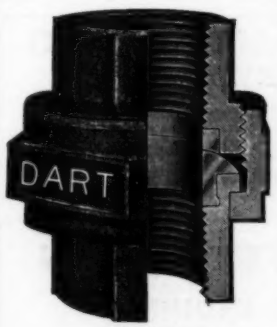
The basement of the new coating mill contains storage space for 2,500 tons of coating and 8,000 tons of filler clay as well as for the lime slacking plant. The overall dimensions of the building are 155 by 800 feet and built so as to take paper directly from the fourdriniers on the coaters, thence through each process to packaging and shipping.

The Pope Appliance Corp., owners of important papermaking patents, with main offices at 88 Milk Street, Boston, Mass., have been notified that the King and Council of Great Britain have granted leave to the Pope Appliance Corp., to prosecute their appeal against the judgment of the Supreme Court of Canada in favor of the Spanish River Pulp & Paper Mills in regard to Canadian Patents 192726, known as the Calendar Feed Patent. The appeal cannot be heard before the summer months. It is recalled that in the suit to which the appeal relates, the air jet patent of the Pope Appliance Corp., was sustained.

Much of the recent strength in International Paper Co. stock has been due to its great power interests in the United States and Canada. In connection with the New England Power Association, 45 per cent of whose common stock is owned by the International Paper Co., it is noted that John R. Macomber has headed a group of Boston capitalists who have taken over another 45 per cent of the common stock which was formerly controlled by Stone & Webster, the Northeastern Power Association and F. L. Carlisle & Co., leaving but 10 per cent in the hands of the public. The new owners of the second 45 per cent are entirely friendly to the I. P. Co. interests.

Paper Company Stocks Up

Great Northern Paper Co. stock has mounted to 93, the highest price in its history on active trading in the un-



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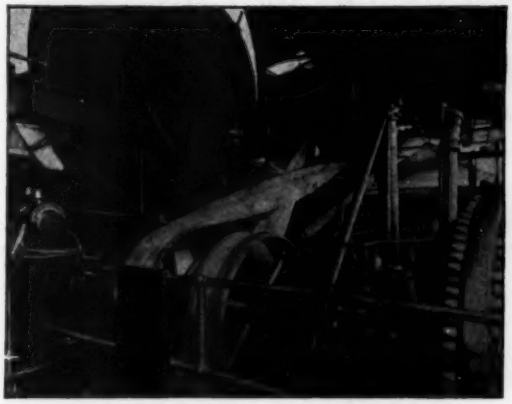

3,297 BELTS, 67% LEATHER

ONE paper mill uses 3,297 belts, exclusive of conveyors, and 67% of them are leather. This shows one mill's attitude regarding the comparative value of leather and fabric belts.

Recently in another mill a 36-inch, 3-ply Tannate Watershed Belt was installed to replace a 36-inch, 10-ply rubber. The rubber belt slipped so badly that they had to increase the speed of the engine to deliver sufficient pulp.

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listed market. This price should be viewed in the light of two stock dividends in the last eight years the second of which divided the common four shares for one.

Other New England paper company shares are firm. Eastern Mfg. Co. at 45 is a substantial gain and reflects confidence in the new management. Keyes Fibre Co. Class A common is selling at 44, Orono Pulp & Paper at 40, Oxford Paper common at 183 registers a new high mark.

By the afternoon of the day it was issued, the entire ten million 6 per cent preferred of the Brown Co., a new issue to retire bonds and for development purposes was oversold. It was placed on the market by three Boston houses: Bond & Goodwin, Lee Higginson and Baker Fentress & Co.

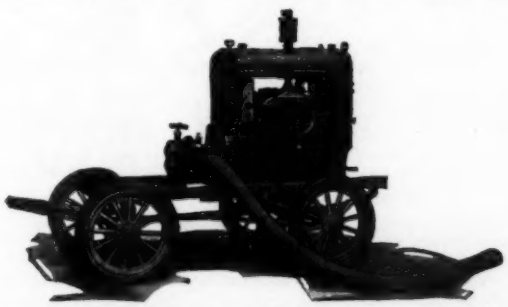
Hammermill Paper Co. held a joint sales promotion meeting with its two Boston distributing houses, Storrs & Bement Co. and Carter Rice & Co., on the evening of May 8 at the Boston Chamber of Commerce. Speakers included E. A. Frampton on Advertising and Its Opportunities, H. R. Baldwin on Hammermill Policies and Products, C. W. Chabot on the Economics of Salesmanship. All speakers were of the Hammermill Paper Co. A moving picture, "The Voice of Business" showing papermaking step by step was shown for the benefit of some 400 printers, customers of the local merchants who had been invited.

Charles H. Howard, 78 years of age and treasurer of the American Reinforced Paper Co., of Attleboro, Mass., died on April 15 at his home. Mr. Howard perfected a process for making building paper about 20 years ago. His plant, however, was not established until 1919 and has grown to a point where in 1927 it did a million dollars gross turnover.

New Portable Engine Driven Rotary Pumping Unit

A portable, engine driven, rotary pumping outfit has been recently developed by Goulds Pumps, Inc., Seneca Falls, N. Y. It is designed for the use of small villages or communities and industrial plants having no regular fire protection. In addition to fire service, the unit is suitable for handling clear water for any general emergency service within its ratings.

This pumping outfit consists of a gear type rotary pump, close coupled by means of a pin and buffer flexible coupling to a gasoline power unit. The pump and engine are mounted



on a four wheel trailer having rubber tires and springs, front and rear. The pump is equipped with relief valve and discharge gate valve, which may be threaded to suit various hose coupling threads. The suction is fitted for 4 inch suction hose.

The pump, having an iron case and bronze cams, is equipped with ball bearings throughout and bolted and doweled to the power unit frame by means of an open adapter casting which allows perfect access to the flexible coupling.

The engine is a standard, self contained, enclosed, industrial power unit with all accessories, ready to run as soon as fuel, oil and water are added.

The trailer chassis is a steel frame fitted with springs both front and rear. The wheels are fitted with roller bearings of the completely enclosed type and the tires are of hard rubber.

The outfit will throw a standard, 250 g. p. m. fire stream through a 1-⅛" standard hose nozzle with a pressure of 100 ft. of 2-½" hose.

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All Kinds of Scales

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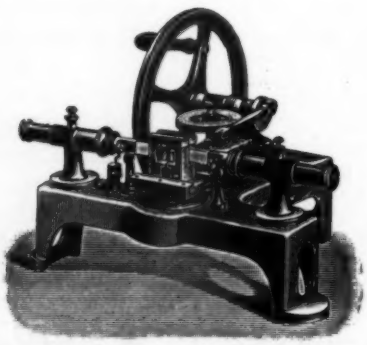
Uniformity of beating means better paper.

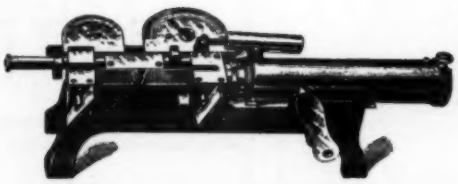
The Schopper Standard Desk Micrometer
Carried in stock—1/1000 of an inch for Boards, 1/2000 of an inch for Paper.



Schopper Folding Tester
The folding test has become standard for bonds, ledgers, and Kraft papers.

Schopper Strength and Stretch Tester

Small Piece Pocket Paper Scale
By weighing a piece 2 in. by 4 in., gives basis weight 25x38, 24x36, 22x34, 500 sheets.



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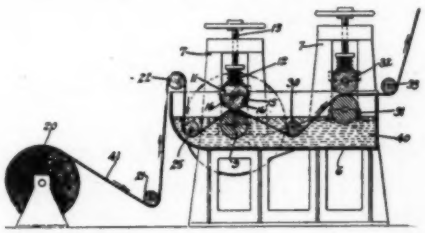
Technical Developments in the Paper Industry

Domestic and Foreign

The following abstracts are of the latest developments found in the foreign press and the domestic and foreign patent offices. Photostats and translations of complete articles and patents can be obtained at cost price.

Imprinted Paper

UNITED States Patent No. 1,666,031, which is issued to D. D. Madden and assigned to Pacific Northwest Paper Mills, Inc., Portland, Ore., is concerned with a process for



producing a number of tints on paper from a dye of a single color. The process consists in immersing the paper in the liquid dye and directly thereafter passing the wet paper under pressure between impression rollers which are provided with printing designs. Then the paper as it leaves the rollers, is passed directly through the dye liquor a second time. The apparatus used in carrying out this process is seen in the accompanying illustration.

Distinguishing Bleached from Unbleached Mechanical Wood

THE best re-agent with which to distinguish between bleached mechanical wood pulp and unbleached is a solution of stannous chloride acidified with hydrochloric acid. Mechanical wood pulp is bleached with sulphurous acid or sulphites and hence traces of sulphur compounds are always present in the bleached product. If, then, a sample of bleached mechanical wood pulp is treated with a solution of stannous chloride, then due to the conversion of the stannous chloride into stannic chloride nascent hydrogen is liberated, and this decomposes the sulphur dioxide present in the bleached plup converting it into sulphuretted hydrogen. The slightest trace of this gas is detectable with the aid of acetate of lead paper.

The test is carried out in the following manner: From two to five grams of wood pulp in the so-called dry state are placed in a beaker of approximately one hundred cubic centimeters capacity. The sample of pulp is covered with the stannous chloride solution and the mixture is then heated. The watch glass, covering the beaker, is covered with a piece of lead acetate paper. If this paper becomes black due to the evolution of steam rising from the boiling liquid and containing sulphuretted hydrogen, then a sulphide of lead is formed. It can then be deducted that the mechanical wood pulp has been bleached with the aid of sulphite bleach. The amount of sulphite compounds left behind in the bleached mechanical wood pulp may be estimated from the intensity of the black coloring on the lead acetate paper.

The question as to whether or not bleached mechanical wood pulp is contained in the finished paper cannot be solved in this fashion, for unbleached mechanical wood pulp can also contain traces of sulphurous compounds, which are found in every paper mill. Under these conditions, the paper will, of course, give the same reaction with stannous chloride as bleached pulp. Zellstoff und Papier, 1928, 458.

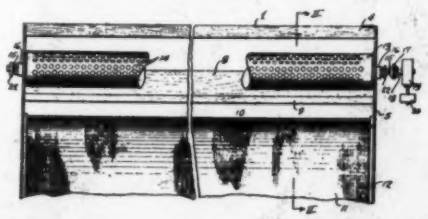
Decrease in the Sizing Quality of Frozen Pulp

BEATEN pulp is subjected in the wet condition to temperatures varying between minus 10 to minus 20 degrees C. It was found that the pulp no longer possessed satisfactory sizing quality. This must be assigned to the loss of swelling or hydrating power and capacity for absorption. Additional investigations are being carried out to determine the exact character of these processes.

An improved method for determining bleached and unbleached pulp is also explained. The pulp sample is dyed with a two per cent solution of Malachite Green containing acetic acid. The sample is then heated over a flame in order to dry it completely. This operation must be carried out with great care. Thereafter, the sample is well washed and treated for approximately one minute with a one per cent solution of Fuchsin and then washed with a weak hydrochloric acid solution (one cubic centimeter of concentrated hydrochloric acid per lite of water) until the color has been removed. Afterwards, the sample is washed with water and then examined under the microscope. The following colors are observed: completely bleached pulp colorless, semi-bleached pulp slight pink tinge, unbleached pulp red and mechanical pulp bluish-green. A report from the Government Paper Testing Institute. Bumaschnaja Promischenlennost, volume 6, year 1927, pages 336ff.

Cylinder Papermaking Machine

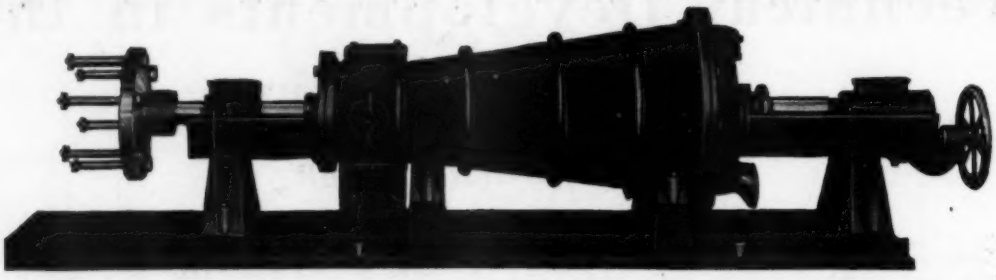
THE vat for the cylinder mold has a transverse partition (9) which terminates below the side walls of the vat, and in front of the mold. A perforated drum (14) is mounted



transversely within the vat and it completely fills the space between the top of the partition and the top of the vat side walls. Hence, all of the stock must pass through the perforated drum in its flow to the cylinder mold. A. T. Yoder, Mosinee, Wis. United States Patent No. 1,664,722.

Paper Pulp from Grasses

A SEMI-CONTINUOUS process for the preparation of cellulose or paper pulp from bamboo, grasses, wood or reeds working on the cascade system of digestion in a closed ring in which each digester is charged in turn, the stock in any one being then subjected to a series of treatments with caustic liquor, or mixed caustic and sulphide or sulphite liquors, at successively increasing pressures and concentrations, the stock being subsequently leached and washed, is characterized in that the digesting liquor after use in any one digester is passed to the digester next-but-one lower in the cycle of operative sequence. The liquor is blown over by the higher steam pressure in the first digester and is made up with wash water to the desired volume and concentration. The stock may be



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2— Means of quickly maintaining alignment of plug and shell.

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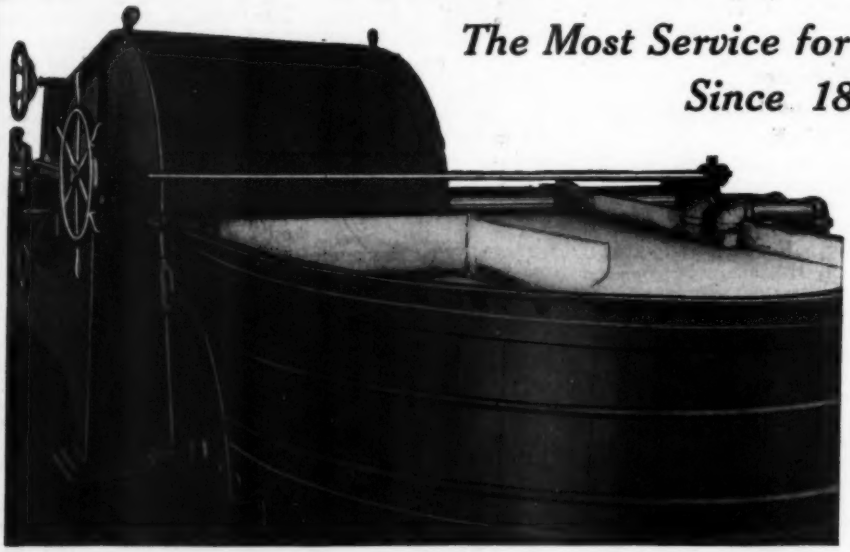

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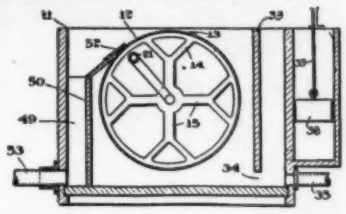
When You Need a Roll or Plug Let Emerson Quote You

EMERSON MFG. COMPANY, LAWRENCE, MASS.

given a preliminary treatment with boiling water or with used liquors at low pressure. B. Cable, Sir G. C. Benthall, E. S. Tarlton and H. F. Wheeler and E. Spencer, Calcutta, India. British Patent No. 283,910.

Regulating Consistency of Pulp Stock

A RELATIVELY small proportion of the stock is passed into a vat (11) and the stock is screened through the screen (13) while it passes through the vat. The deposit on the screen is then permitted to regulate the level of the fluid in the vat and the differences in the level of the fluid in the vat is also allowed to regulate the supply of fluid to the system. C. R. van de Carr, Quebec, Canada. United States Patent No. 1,665.425.



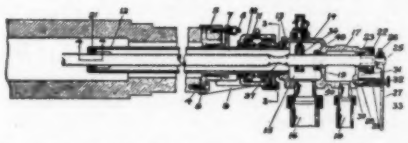
Effect of Pentosans on Paper Sizing

IF A SAMPLE of bleached pulp is mixed with distilled water and made into a mash and then sized with three per cent of rosin, the sample of paper that is made from this pulp will not have any sizing quality at all. On the other hand, if ordinary factory water is employed, possessing a hardness of ten to twelve degrees, then a paper with a good sizing quality is obtained. The thought comes to mind that the alkalinity of the water exerts a certain influence on the obtained sizing quality of the paper. Another experiment was made in which distilled water was employed to which a quantity of soda, corresponding to the degree of hardness in the factory water, has been added. The sizing of the sample was not so good as that when ordinary factory water was employed. Nevertheless, the sizing quality of the paper was much better than that obtained with pure distilled water. It, therefore, follows that some condition or ingredient of the pulp itself must have an effect on the sizing process.

This was found to be the pentosan content of the pulp. The pentosan content of the pulp must apparently have some effect on the hydrating or swelling capacity of the pulp as well as on its ability to absorb rosin. This is a premliminary conclusion that the author has reached, even though his experiments along these lines have not yet been completed. These experiments are being carried out not only to explain the effect of pentosans on the sizing quality of paper but also that of the alkalinity of the water. L. Chinschin, Bumaschnaja Promischlennost, volume 6, year 1927, pages 639ff.

Dryer Mechanism in a Papermaking Machine

THE dryer roll is made in the usual manner and is provided with means for the admission of steam. A siphon pipe (37) extends into the roll closely adjacent to the inner surface



of the roll. This is the feature of the invention as well as the external means provided for flexing the siphon pipe in order to adjust its suction end with respect to the roll surface. C. W. Valentine, assignor, The Bagley & Sewall Co., Watertown, N. Y. United States Patent No. 1,665,614.

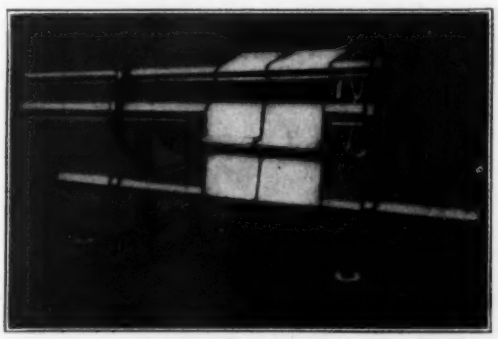
Making Pulp

A HIGH yield of practically pure cellulose is obtained from the most varied kinds of vegetable fibers such, for example, as red pine wood, beech wood, bamboo, straw and resinous woods such as Scotch fir, by the use of boiling lyes containing one or more soluble oxy compounds of the isocyclic series in which at least one hydrogen atom of the oxy group has been replaced by a metal, the metals preferred being those of the alkali group, alkaline earth metals of the magnesium group. As example of oxy compounds are mentioned phenols, such as phenol and cresol, alcohol phenols such as phenol alcohol, cyclohexanol, hydrogenated phenols such as hexahydrophenol, naphthols such as oxynaphthalene tetrahydride or decahydride, methylcyclohexanol, polyphenols such as resorcinol, etc.

The substances are used preferably as solutions or as permanent emulsions and substances such as soaps of castor oil, cyclohexanol and salts of humic acid may be added to render the emulsions permanent. Penetration of the vegetable fibers may be assisted by the addition of alkaline, neutral or slightly acid salts, such as trisodium phosphate, weak acids with basic, slightly alkaline, neutral or acid reaction, metallic bases, aliphatic or aromatic alcohols, etc. Catalticaly acting substances such as barium peroxide may also be used. The reaction may be expedited by boiling under pressure, and under such conditions the attack of the lyes on the cellulose fibers themselves may be checked by adding substances of neutral or alkaline reactions and reducing effect to the boiling lye, either before commencing the process or during boiling. O. C. Strecker, British Patent No. 284,846.

Modern Cylinder Wire and Method of Fastening

GREAT care must be taken to provide the proper fastening of the wire on the cylinder of the rapid-running cylinder machine. One of the great difficulties with the methods used at the present time for fastening the wire to the cylinder is that they require expert knowledge on the part of the op-



erator. A new method and machine for accomplishing this are described by W. Volle in Der Papierfabrikant, year 1928, pages 164 to 165. The accompanying illustration shows the machine employed.

One man only is required to run this machine and it is possible to cover the cylinder with the wire by the aid of this machine in a very satisfactory manner. The tension on the wire as it is being wound around the cylinder is effected with the aid of levers and weights, and the amount of this tension is, therefore, properly regulated for the top and the bottom wire. The results obtained with the aid of this machine were particularly good and a cylinder which is covered with wire under a definite-regulatable tension, will last just as long as any other which had been covered with wire by means of this machine, provided that the quality of the wire remains the same. This machine avoids the necessity for removing a wire, which is still in good condition but which must be taken off the cylinder for the reason that it has become loose.

The tension on the wire is changed by changing the weights or shifting the position of the weights on the lever arms. The apparatus is built in such fashion that any ordinary size of cylinder can be handled by it. This machine will cover cylinders used on papermaking, cardboard making, pulpboard-making, dehydrating and refining machines.

Esparto Papermaking Machines

DETAILS are given on the method used in putting on the wire, that is a new wire. It is of great importance that the greatest possible care should be taken while the wire is being put on the under couch roll, for if any wrinkles or kinks occur at this time, these are the parts that wear out first and long before the usual life of the wire is run. It is also important to clean off all the spindles of the rolls so that no grease or dirt gets on to the new wire.

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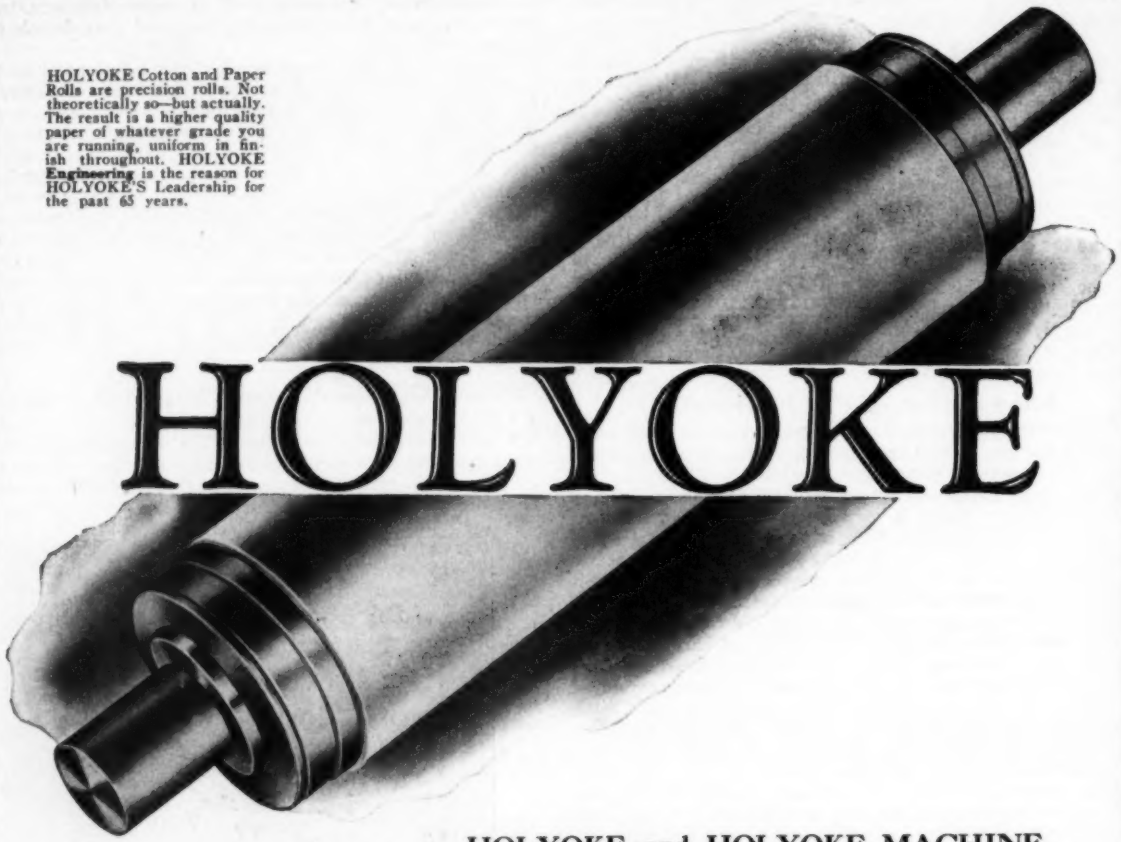

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The details of putting on the couch roll jacket are also given. The jacket should hug the roll after being properly shrunk. The jacket should be so fixed that freedom is allowed it to adjust itself, with an adjustable guard board that can be adjusted at different parts across the roll the seam of the jacket can be kept reasonably straight. It is beneficial to have the top couch roll wider at each end than the under couch roll.

The wear of the wire also receives attention. The result of the wire running straight across is that the knuckles of the warp wires gradually cut into the surface of the suction box spars and make very minute grooves, the exact reproduction of the warp wires straight across the surface of the all polished and has a bright appearance. The knuckles on the underside have a scored and scraped look when the wire is grooving the boxes. The wire also fills up at the back of the seam and not at the seam itself. However, if the offending suction box is changed and the wire is cleaned at the back of the seam, the suction started and side slip obtained on the suction box that has been put in instead of the one that was grooved, there will be no more filling up of the wire at the back of the seam. J. D. Lang, The Papermakers' Monthly Journal, year 1928, pages 114-7.

Improvements in Waste Liquor Evaporation

A SHORT historical sketch is given of the development in this field during recent times, particular attention being paid to the use of multi-stage evaporation, and the like. The use of the electrically-heated evaporator is also discussed. One of the important points considered is the prevention of the deposition of incrustations on the heating tubes. A process which rests only on the straight transmission of heat between a hot and cold body and the utiliza-

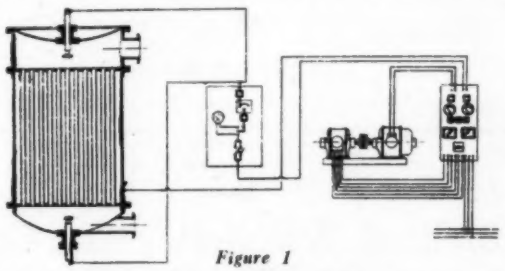

Figure 1

tion of waste heat values is described. Finally, experiments are described on the evaporation of waste liquors by the combustion of the finely atomized liquor in boilers.

Figure 1 shows an arrangement in which electricity is used to protect the heating tubes of an evaporator in which waste liquors are being concentrated so as to avoid the deposition of incrustations on these tubes. Anodes of special material are built into the evaporator,.the anodes being insulated both above and below the heating tubes. These anodes are connected with the positive pole of a source of direct current, while the evaporator is connected with the negative pole. The current flows from the anodes through the liquor to the heating surfaces of the evaporator and thence to the source of current. Direct current of low voltage, ten to thirty volts, is produced by a small motor-generator. The current is distributed to the individual anodes from a switchboard and is regulated by the resistances mounted on this board. The material of the anode must not be affected by the chemicals in the waste liquor. The passage of the current through the evaporater in this manner prevents the deposition of incrustating substances on the heating tubes. Large scale results of such nature have been obtained.

Figure 2 shows the arrangement of apparatus used for recovering the heat in waste steam by the use of high pressure steam purely on the heat interchange basis. A sodium hydroxide liquor is placed on the container (B), the so-called mixing vessel, which is heated by the introduction of the waste steam up to near its boiling point and through a suitable heat exchange device in the steam boiler (C) steam of pressure corresponding to its temperature, that is medium pressure steam practically speaking, is evolved. Hence, the heat of condensation of the waste steam is recovered in this manner as heat of vaporization of the medium pressure steam evolved in the boiler (C). Naturally the sodium hydroxide liquor in the container (B) is diluted by the waste steam that is blown into it. It is, therefore, necessary to provide constantly for its reconcentration, in order to maintain the orig-

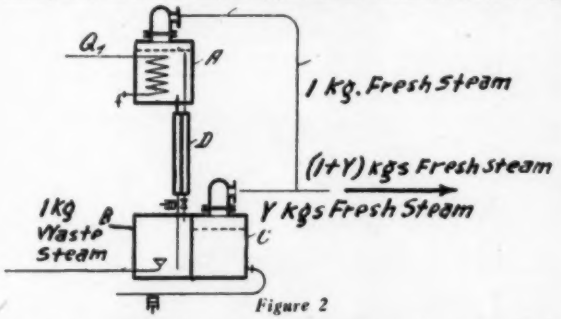

Figure 2

inal conditions. This continuous reconcentration of the liquor takes place in a special vessel (A), in which a concentrated sodium hydroxide solution is found. Liquor from the mixing vessel passes constantly through the heat exchanger (D) into the vessel (A), in order to be concentrated in the latter vessel. The concentration is effected with the aid of high pressure steam and the concentration of the liquor in (A) is regulated in such a manner that when the liquor boils, vapors of the same medium pressure are formed as exists in the boiler (C) due to the heating of the mixing vessel (B). The steam produced is mixed together. Utilization of the waste heat is thus effected in the simplest possible manner.

The author also discusses the methods of direct evaporation of sulphite liquor by blowing it into a fire tube boiler. The difficulties surrounding such a process are also described and they appear to be due mainly to the fact that the spray nozzles become clogged up with deposited material. The author describes what is called a molecular nozzle and this can be seen in Figure 3. Air of two to two and one-half atmospheres pressure is blown into the cone-shaped air inlets of the nozzle and this air is then caused to assume a spiral path. The rapidity of the rotating air is extraordinarily greatly increased by the form of the nozzle. The emerging, very rapidly rotating cone of air forms at the apex of the atomizing cone. Hence, the mass of liquid is distributed in a very efficient manner. The atomizing action is very great and it is claimed that it reaches colloidal proportions. However, it cannot be held that molecular dispersion takes place. It is also claimed that this form of nozzle will not become clogged up under any circumstances. Dr. J. Hausen, Der Papierfabrikant, year 1928, pages 173 to 179.

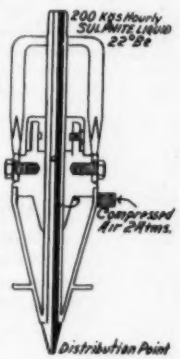

Figure 3

Difficulties with Rosin on the Papermaking Machine

A SYSTEMATICALLY conducted investigation of various samples of pulp with respect to their rosin content yielded the conclusion that the rosin content varies between 1.03 and 2.3 per cent. Under the microscope it is observed that the rosin adheres to the cellulose fibers in the form of small lumps or is often present within the internal structure of these fibers. It is highly noteworthy that not every kind of pulp with a high rosin content involves difficulties in its processing. It often happens that pulps with a low rosin content entail difficulties in processing and, in fact, under these conditions it has sometimes been found that rosin spots as big as five to eight millimeters in diameter are formed on the paper web. Then again the same quality of pulp, containing the same proportion of rosin, will yield different results on different papermaking machines. Thus, in some

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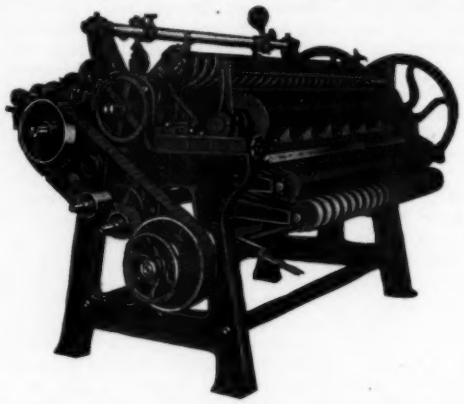

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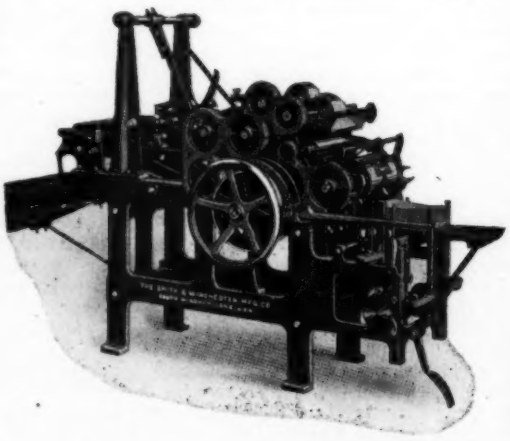


Paper Bag Making Machinery

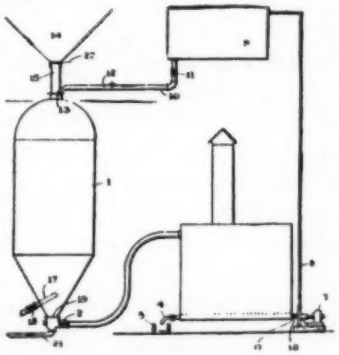
cases, the difficulties were rather great, and on others they did not exist at all. The experiments which were carried out were unable to establish the reasons for this strange behavior of the pulp. Nevertheless, it was established that the difficulties became greater as the temperature of the stock rose, as may be occasioned by increased room temperature or by prolonged beating (five to ten degrees C. temperature rise).

Examination of the various rosin samples gave very irregular results, which were not able to afford any basis on which a conclusion could be reached. The author assumes that the difficulties are occasioned by the formation of an emulsion containing resinic and fatty acids and water, whereby the calcium salts of the pulp act as capillary-active substances. The mechanical preliminary conditions are given by the movement of the beater.

It was observed that the wire can be more easily cleaned by means of acids than by alkaline liquors. In the first case a colloidal solution is formed, which can be easily removed. The rosin spots contain considerable quantities of calcium sulphate and iron. The author believes that a decrease in the mineral ingredients of the pulp (that is its ash) causes a decrease in the rosin difficulties. On the other hand, the addition of milk of lime is helpful. This is the Enkel method, which has been successfully used by a number of paper mills. The milk of lime, which must be added some time before the aluminum sulphate, reduces the acidity of the beater contents and hence increases the dissociation of the aluminum sulphate, whereat the precipitation of the aluminum hydrate and the flocculation and fixation of the rosin are, therefore, enhanced. However, the stock will have a grayish cast due to the use of the lime. The author believes that it would perhaps be advisable to neutralize the white water first and then to use this water so as to avoid all inconvenient lye-reactions. A. Malinowskij, Bumaschnaja Promischlennost, volume 7, number 1, pages 12ff.

Charging a Sulphite Digester

THE finished digested stock is blown out of the digester (1) into the vessel (3) and the hot liquor is removed from this container by means of the pump (7) into the storage tank (8). While the digester (1) is being charged with wood chips from the container (14), the hot liquor is allowed to run simultaneously from the container (9) through the pipe (10) and the nozzle (13) into the digester, and this liquor can thereafter be drawn off at (17) and (18). This simple process of charging the digester makes possible a saving of fifteen per cent of the heat that otherwise goes to waste and, furthermore, about fifteen per cent more of wood is digested in the apparatus than is possible when the digester is filled with the wood chips in the usual manner, that is, when these chips are cold. G. H. Tomlinson, United States Patent No. 1,657,048.



Making Paper Pulp and Utilizing Waste Products

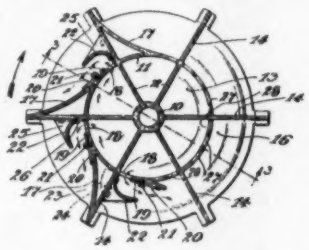
IN THE preparation of paper pulp from cornstalks, straw, flax, esparto grass, and the like, and the recovery of non-cellulosic components in a suitable form, the material is treated in three definite stages. The material is finely shredded, and the water soluble constitutents, largely saccharides, other sugars and salts, are removed by leaching in a stream of hot or cold water. Counter-current treatment may be used, the process taking four to five days. The liquor may be evaporated to a syrup and used as an addition to stock food, or it may be fermented to produce alcohol.

The leached material is then disintegrated in a beater, then boiled with caustic soda liquor at ordinary or increase pressure, just enough alkali being used to react with the silica present. The cooking may be done in a beater. The material is separated from this liquor and washed. The liquor containing sodium silicate and a small amount of pentosans which may be separated and used as such or added to the leach liquor from the first stage.

The partially cooked material is then placed in an ordinary digester and cooked with sodium hydroxide in the ordinary manner, the temperature and pressure being such as to avoid caramelization of the pentosans. After this cooking the liquor is drawn off and the pulp washed and bleached in the usual manner. The waste liquor from this cooking, containing large amounts of pentosans loosely combined and certain amounts of sodium carbonate and other products is preferably treated with carbon dioxide, or it may be treated with sulphur dioxide by which the pentosans are precipitated. B. Dorner, Budapest, Hungary, assignor, Euromerican Cellulose Products Corpn., New York. British Patent No. 283,851.

Centrifugal Pulp Screen

AS MAY be seen from the accompanying illustration, the centrifugal pulp screen is composed of a stock distributing device which comprises a hub (10), a cylindrical member (11) and blades (14) extending out from the hub and beyond the cylindrical portion (11). A number of vanes (17) are associated with the outer portion of the cylindrical part and an adjacent portion of one of the blades. A number of deflector plates (22) are also provided and each one of these plates is associated with a vane and so constructed and secured in position as to positively direct the passage of stock to the corresponding vane. This arrangement affords uniform and thorough circulation and distribution of the stock in the centrifugal pulp screen. G. F. Shevlin, assignor, G. F. Shevlin & Son, Glen Falls, N. Y. United States Patent No. 1,664,996.



Power and Pulp from Gangwa and Hyacinths

Experiments have been successfully carried out in the Science College, Calcutta, which are claimed to open up practically limitless possibilities of producing power alcohol and other products from sawdust and water hyacinth. The Engineer, of London of Feb. 17, 1928, states that Professor H. K. Sen, who conducted the experiments recently, reported in an address before the Indian Science Congress, that 40 gallons of absolute alcohol had been obtained from a ton of gangwa sawdust, while trials with trees in other countries had yielded only about 50 per cent of that quantity. The gangwa tree grows wild in the Sunderbans and is the cheapest fuel obtainable in Bengal. As it is a fast grower, a perennial supply could be maintained by the Forest Department. Water hyacinth, which is a pest in Bengal waterways, has also been shown to have similar potentialities. A hundred maunds (8282 lb.) of it dried are said to have yielded 12 maunds (987 lb.) of pure potassium chloride, 35 to 40 (British) gallons of spirit and about 20 maunds (1646 lb.) of pulp, which can be converted into straw boards. The utilization of the pest would have very desirable results, as it would help to clear up the Bengal waterways, in addition to furnishing important commercial products.

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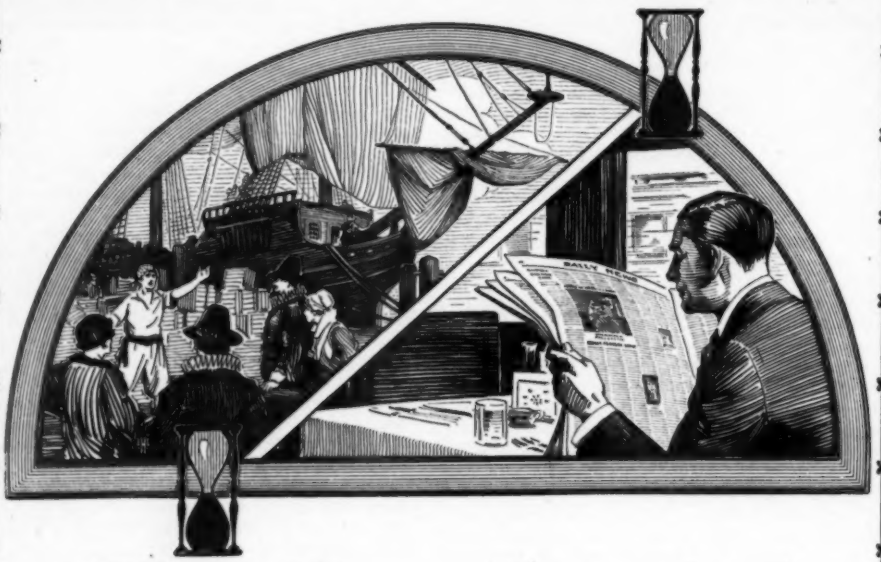

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THERE appears every reason to believe, and reports in most cases substantiate the view, that the market movement of paper is fairly active and measures up quite well with that ordinarily witnessed at this period of the year. There are some high spots in the market, as well as low, where certain classes of paper are in very good demand, while others are relatively quiet; it is also apparent that the rank and file of consumers and converters are placing orders as their requirements materialize, which is another way of saying that demand is somewhat spotty though in the aggregate of moderately large volume. One thing is certain, and that is that the development of business is consistent, this, of course, being a necessary characteristic while buyers are operating in the hand-to-mouth manner that they are. Evidently, consumers have found through experience that they can get all the supply of paper that they want when they want it, being occasioned practically no difficulty nor delay in securing deliveries from mills or jobbers, and, this being so, and other inducements for buying ahead being more or less eliminated, it is not surprising that buyers are operating to fill actual and direct needs and are giving scant attention to forward requirements.

While production of paper and board is on a fairly high level, and although demand is of moderately wide dimensions, the market situation is not altogether to the liking of manufacturers. There simply isn't the profit in paper producing that the industry is reasonably entitled to. Competition has reduced the margin of return to the manufacturer to so narrow a basis that there is small doubt that in some instances paper is being produced and marketed today at no remuneration at all to the manufacturer, while the profit margin generally is much closer than it rightfully should be. Thus, although most paper mills are well engaged, and notwithstanding a fairly heavy movement of supplies into consuming channels, the producing industry is not realizing the return that it ought, which is the basis for considerable complaint heard in various parts of the trade.

The market outlook is regarded as favorable. The fact that buyers are operating so close to their needs seems assurance enough that demand should keep up in at least its present volume, since there is little or no accumulation of stock in the hands of consumers and converters. The general business prospects are bright. Record-breaking activity in some of the basic industries of the country should lead to improvement in other directions, and, as far as paper is concerned, certainly should make for a continued good demand for this commodity. Bankers and economists, merchants and manufacturers, and other lights in the commercial firmanent look for consistent and stabilized business over the remainder of this year, the political campaigns and other influential factors notwithstanding, and the paper market most assuredly should share in the trade activity that is anticipated.

Latest production statistics indicate that paper and board mills are working at a fair pace. The monthly statistical summary compiled by the American Paper and Pulp Association shows that the total production of paper of all kinds in the United States in February amounted to 551,801 net tons, compared with 551,941 tons produced in the preceding month by identical mills. Shipments from mills during February aggregated 547,637 tons of all grades, against 542,189 tons in the preceding month, while stocks on hand at mills at the end of February were 255,367 tons, contrasted with 252,571 tons a month previously.

Newsprint output in March recorded a fair gain over that in the preceding month, according to figures compiled by the News Print Service Bureau. During March, Canadian mills made 197,976 tons of newsprint and shipped out 190,305 tons, while United States mills produced 119,932 tons and shipped 113,752 tons, making a total of 317,908 tons produced and 304,057 tons shipped in that month for both countries, as compared with a production of 302,124 tons and shipments of 297,829 tons in February. During March, 19,577 tons of newsprint were manufactured in Newfoundland and 1,190 tons in Mexico, so that the total North American production for the month amounted to 338,675 tons, against 320,810 tons in February. The Canadian mills produced 87,843 tons more in the first three months of 1928 than in 1927, which was an increase of 18 per cent. The United States mills produced 36,796 tons, or 9 per cent less than in the similar period last year, while the Newfoundland output was 3,522 tons, or 7 per cent, more, and the Mexican production was 502 tons more, making a total North American increase of 55,071 tons, or 6 per cent over the first three months of 1927. During March the Canadian newsprint mills operated at 80.3 per cent of their rated capacity, and the U. S. mills at 79.7 per cent. Stocks of newsprint at Canadian mills totaled 47,657 tons at the end of March, and at U. S. mills 34,638 tons, making a combined total of 82,295 tons, which was equivalent to 5.6 days' average production.

An appreciably large gain was noted in the production of paper board in the United States in March as contrasted with February. Mills of the country manufactured a total of 227,802 tons of board of all kind in March, against 211,032 tons in the preceding month, according to the monthly statistical summary of the board industry compiled by the U. S. Department of Commerce. New orders received by mills during March called for a total of 250,059 tons of board, against 215,256 tons in February, while unfilled orders held by manufacturers at the end of March were for 94,085 tons, compared with 86,780 tons a month previously. Shipments of board from mills in March aggregated 238,117 tons, which were 10,000 tons in excess of the month's production, and compared with 209,653 tons in February,while stocks of board at mills were reduced from 50,490 tons at the end of February to 40,428 tons at the close of March. Board mills consumed a total of 209,806 tons of waste paper in March, against 192,521 tons in the preceding month, and had stocks on hand amounting to 139,775 tons at the end of March, compared with 142,723 tons a month earlier.

Quoted prices of most kinds of paper are fairly well maintained. There are some instances where manufacturers are granting slight concessions to meet competition, but in a general sense, paper prices are well stabilized and are undergoing little change. Fine papers especially display price firmness, and demand is developing in fairly good tonnage. Manufacturers apparently are proceeding on the theory that lower market levels would fail to stimulate buying on the part of consumers, and are adhering to the prices quoted. The movement of newsprint keeps up in fairly big volume, and quotations of mills are stationary, nor does there appear to be any alteration contemplated.

Book paper prices are being shaded in certain instances, due to mills reaching out for business. It is stated nevertheless that there is fairly large movement of such papers, particularly on contracts. Wrapping and tissue are steady quotably, and in good demand. Box board quotations in the East are on a level of $47.50 per ton for filled news board delivered in New York City, and $45 for plain chip board. A decidedly better call is reported for roofing felt and building papers, reflecting the spring revival of building in various parts of the country, while wall board also is in more demand.

The Rust Engineering Co., Pittsburgh, Pa., announces a change of address to American Bank Building, Sixth Avenue and Grant Street.

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Kansas City **St. Louis** **Atlanta**

Papermaking Rags

From all accounts, there is a better demand for the lowest class of papermaking rags or roofing stock, and also for the highest grades or some of the new cotton cuttings. Mills consuming such descriptions are manifesting more interest and have increased their purchasing at least to some extent recently; in certain instances to a sufficient degree to cause a little strengthening of market prices, yet the rag market as a whole continues to display quietness and the aggregate amount of business transpiring doubtless is below par. It would seem as if the entire fault of the rag situation as it exists and has existed for a considerable length of time, is that the paper manufacturers simply are not using as many rags as they did at one time; that is, in proportion, of course. Rag papers in a great many instances have been supplanted by sulphite papers, and while there is possibly just as large a tonnage of rag paper being produced in this country today as ever before, and consequently just as big a quantity of rags being consumed by paper mills, the percentage of increase in consumption of rags has not been and is not now keeping pace with the growth in the output of wood papers and the resultant gain in wood pulp consumption.

Obviously, under such marketing conditions, the supply and price situation is very much in favor of buyers of rags. Papermakers seldom are experiencing difficulty in getting all the rags they require, neither are they occasioned any trouble in securing prompt deliveries, while prices—with some little exception, of course,—are holding on more or less stationary levels. Consequently, consumers are buying almost solely as their needs develop, and in all likelihood are carrying smaller stocks of rags than formerly was their wont, because they feel they can easily obtain any additional supply that they might want at any time.

However, some roofing paper manufacturers have been more actively in evidence as buyers lately, and demand from such sources has sent prices of roofing rags to a slightly higher plane. Domestic No. 1 roofing stock or cloth strippings are reported bringing 1.85 cents a pound f. o. b. dealers' shipping points, and No. 2 domestic roofing 1.50 cents, while foreign dark colored cottons have sold at an advance of about $2 per ton or at 1.60 cents a pound ex dock New York and other American Atlantic ports with some reports heard of transactions at 1.65 cents. Prices of roofing stock are ruling quite firm in Europe, where dealers appear altogether unwilling to enter commmitments below certain well-defined levels, and this is a factor aiding the market here because purchases are difficult to effect abroad at under the ideas of sellers.

Similarly, demand has increased sufficiently to prompt a little stiffening of prices on some grades of new cuttings. Canton flannels have been sought freely and have sold to mills at 9.50 cents a pound for bleached f. o. b. dealers' points, while light silesias have moved readily at 7.25 to 7.50 cents at shipping points, blue overall cuttings at 6.75 to 7 cents, and unbleached cuttings at 10 to 10.25 cents. White shirt cuttings are steady in price at 11.50 to 12 cents per pound for No. 1 quality, and between 7.25 and 8 cents for No. 2 grade.

In old cottons, whites are reported selling in a routine manner and at maintained market prices. No. 1 repacked whites of extra grade are fetching up around 6 to 6.50 cents a pound at dealers' points, with some packings available at 5.50 cents, while No. 2 repacked whites are bringing 2.50 to 3 cents per pound. Repacked thirds and blues are unchanged in price at around 2.25 cents a pound f. o. b. shipping points, and miscellaneous blues are quoted at 1.75 to 1.90 cents.

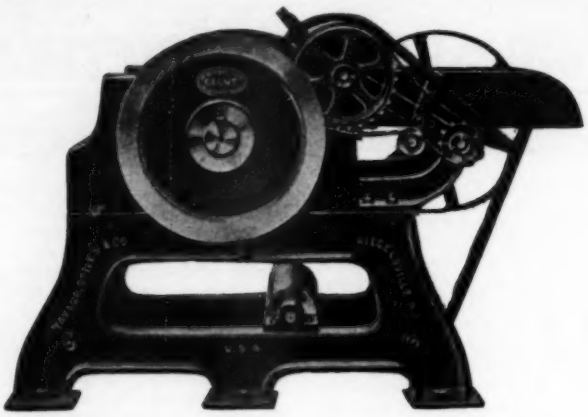
Foreign rags of most kinds are moving slowly. One reason for this, so importers state, is that prices prevailing in Europe are relatively above our market; particularly is this so in Germany, where paper mills apparently are quite busy and are consuming rags on a fairly heavy scale. The better grades of foreign old cottons are exhibiting very little market activity here, and but occasional transactions are reported in imported new cuttings. In fact, it would seem as if the bulk of trade activity at present in foreign rags involves roofing stock, and there has been no unusual movement of these grades.

Average quotations f. o. b. shipping points and ex dock New York are as follows:

New Stock	New York and Chicago
White shirt cuttings, No. 1	11.50-12.00
White shirt cuttings, No. 2	7.25- 8.00
Fancy shirt cuttings	5.50- 5.75
Washables, No. 1	4.25- 4.50
Unbleached muslin	10.00-10.25
White lawns	9.25- 9.50
Overall cuttings, blue	6.75- 7.00
Black silesias	4.50- 4.75
Light flannelettes	8.00- 8.25
Canton flannels, bleached	9.25- 9.50
Conton flannels, unbleached	8.50- 8.75
Shoe cuttings, bleached	8.25- 8.50
Shoe cuttings, unbleached	6.50-6.75
Light silesias	7.25- 7.50
O. D. khaki cuttings	5.50- 5.75
Mixed khaki cuttings	5.50- 5.25
Corduroy cuttings	3.25- 3.50
Cottonade cuttings	3.25- 3.50
Linens, No. 1, white foreign	13.00-14.00
Light prints, foreign	2.75 3.00
Old Stock—	
Whites, No. 1, repacked	5.50- 6.50
Whites, No. 2, repacked	2.50- 3.00
Whites, house soiled	2.00- 2.25
Whites, street soiled	1.85- 2.00
Lace curtains	5.75- 6.00
Thirds and blues, rough	1.75- 1.90
Thirds and blues, repacked	2.15- 2.35
Black stockings	4.00- 4.25
Cotton canvas, No. 1	4.75- 5.00
White cotton batting	4.75- 5.25
Roofing, No. 1 (cloth strippings)	1.80- 1.90
Roofing, No. 2	1.50- 1.60
Linsey, garments, foreign	1.75- 1.85
Dark colored cottons, foreign	1.60- 1.65
Blue linens, foreign	3.75- 4.00
Gray linens, foreign	4.00- 4.25
White linens, foreign	7.50- 8.00
Light prints, extra foreign	1.80- 2.00

Rope and Bagging

Prices of old rope have stiffened, due in part to more demand from paper mills and partially to a tightening of the supply situation. Dealers assert that the market for old rope has been permitted to work down so low that the collection of the article has been discouraged, and that the little uptrend in prices recently is nothing else than a natural reaction from the depressed prices ruling previously. In most cases, domestic No. 1 old manila rope now is quited at 3.50 cents per pound f. o. b. dealers' points, and sales to paper mills have been recorded at this basis, while foreign old rope is quoted at 3 cents a pound ex dock New York with importers frequently asking above this price. Strings are moving along at a steady pace and at maintained prices, mixed strings bringing around a cent per pound at dealers' shipping points, and substantially higher being paid for special quality packings.



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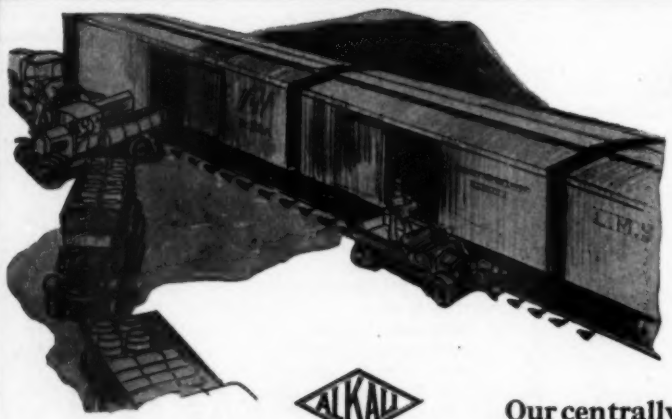

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For quick service, high quality and a dependable source of supply specify Diamond Brand Alkalies.

DIAMOND ALKALI CO.

Pittsburgh, Pa.
and everywhere!

The principal activity in scrap bagging is in roofing stock. Bagging has moved fairly freely into felt mill channels, and at steady prices. Mills are paying 1.30 cents a pound f. o. b. dealers' points for roofing bagging and perhaps have exceeded this price slightly in some instances, whereas No. 1 scrap bagging is hardly worth more than 1.65 cents a pound at shipping points and is in limited demand even at this price level.

F. o. b. shipping point and ex dock New York quotations follow:

	New York and Chicago
Gunny, No. 1 domestic	1.65-1.80
Gunny, No. 1 foreign	1.60-1.70
Scrap bagging, No. 1	1.60-1.70
Roofing bagging	1.25-1.35
Wool tares, heavy	2.25-2.50
Wool tares, light	2.00-2.25
Manila rope, No. 1 foreign	3.00-3.25
Manila rope, No. 1 domestic	3.25-3.50
Sisal strings	1.75-2.00
Mixed strings	.90-1.10

Old Paper

Demand for book stock, which is brisk and which from all indications is going partially unfilled, continues to be the outstanding feature in the old paper market. Mills all over the country are reported eagerly purchasing books and magazines, and granting higher and higher prices to secure needed supplies. The current level of prices represents an advance of some $10 per ton within a couple of months or thereabouts, and it can be said that the market is still pointed strongly upward. There is also a fairly steady demand for folded news, mixed paper and the other grades used chiefly by box board mills. On the other hand, shavings of most descriptions are moving shlowly, and certain of the other grades are in a quiet market position.

Sales of No. 1 heavy old books and magazines have been reported at prices netting dealers 1.85 cents a pound f. o. b. their shipping points, and perhaps a bit higher; in fact, it is a difficult matter for consumers to buy under this stated level any longer. Crumpled book stock is fetching 1.50 cents a pound at shipping points, and over-issue magazines up around 1.90 to 1.95 cents per pound. Old kraft paper is steady quotably at 1.90 to 2 cents a pound at dealers' points, and ledger stock is in good demand and has been helped somewhat as regards price by the uptrend in books, dealers reporting sales of No. 1 ledgers at 1.70 to 2 cents a pound, depending on the packing. No. 1 hard white shavings are reported available at 2.75 cents a pound at shipping points, and soft white shavings on a price range of 2.20 to 2.50 cents, according to the quality. Folded news is selling in the East at 65 cents per hundred pounds f. o. b. New York, and No. 1 mixed paper at 45 cents; in the Middle West considerably higher prices obtain.

The following are quotations named by dealers f. o. b. shipping points:

	New York and Chicago
Hard white shavings, No. 1	2.70-3.00
Hard white shavings, No. 2	2.50-2.75
Soft white shavings	2.20-2.50
Colored shavings	1.00-1.25
Heavy book, No. 1	1.85-1.90
Crumpled book, No. 1	1.45-1.55
Ledger stock	1.70-2.00
Kraft, No. 1	1.90-2.00
New kraft cuttings	2.50-2.75
Manilas, No. 1	.75- .85
White blank news	1.40-1.50
Overissue news, No. 1	.75- .85
Folded news	.65- .75
Sulphite mill wrappings	.70- .80
Old corrugated boxes	.60- .65
New corrugated box cuttings	.80- .90
Mixed paper, No. 1	.45- .60
Common paper	.35- .40

Pulpwood

The market for pulpwood is very much of a stationary affair, with prices recording little change and depending in

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FAST BOND YELLOW N T G G
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ECONOMY can never be mistaken for cheapness. In the matter of sizing material, starch is cheaper than an all-glue size, yet the results are identical—in fact, the paper made with starch sizing is stronger.

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Paper Makers Chemical Co., Easton, Pa., Holyoke, Mass.
Western Paper Makers Chemical Co., Kalamazoo, Mich., Pensacola, Fla., Jacksonville, Fla., Savannah, Ga., Comstock, Mich.
C. K. Williams & Company, Easton, Pa., Emeryville, Cal., Malaga, Spain.
Georgia-Louisiana Company, East Point, Ga., Marrero, La.
Superior Pine Products Company, Fargo, Ga., Tarver, Ga.
Empire Size & Chemical Co., Albany, N. Y.
Adirondack Mineral Co., Carthage, N. Y.
Superior Sizing Company, Lockport, N. Y.
Paper Makers Importing Co., Easton, Pa., St. Austell, Cornwall, Eng.
Vera Chemical Co. of Canada, Ltd., Freeman, Ontario
Vera Chemical Corporation, Stoneham, Mass.
Vera Chemical Company, North Milwaukee, Wis.
John Regnier & Son Company, Boston, Mass.
George S. Mepham & Company, East St. Louis, Ill.
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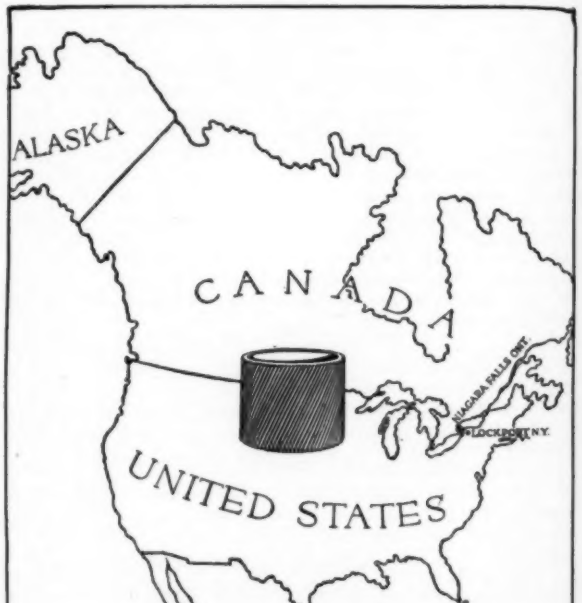

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large measure on the vicinity in which the wood is purchased, freight rates, and other similar marketing factors. Demand is moderate, but not much open-market business of importance is noted.

During the first two months of this year exports of pulpwood from Canada, all of which came to the United States, amounted to 286,838 cords, valued at $2,590,613, compared with 291,272 cords of a value of $2,708,686 exported in the similar period of 1927.

Mechanical Pulp

There is not much activity in the market for mechanical wood pulp. There is business passing right along, of course, and producers appear to be getting rid of the bulk of their output, but the market lacks life; buying by transient purchasers is limited, very much so, and most of the activity that is to be seen consists of shipments against contracts. Most consumers, in fact, seem to be getting along with contract commitments in such a manner as to preclude any necessity of them operating in the open market, and in other instances consumers who grind their own pulp apparently are supplying their requirements in a way which keeps them also out of sight as actual or potential buyers.

However, prices as quoted are holding to previous levels, and there is marked objection on the part of grinders in accepting lower figures in sales. Prime spruce ground wood of Canadian origin is quoted at around $23 per ton f. o. b. pulp mills in the Dominion, prices depending on the air dry test and the haul to consuming centers, while domestic ground wood is up in the vicinity of $26 to $27 a ton at producing plants. Scandinavian ground wood of prime quality is quoted at $31 per short ton ex dock American Atlantic ports for shipment from abroad.

A total of 85,751 net tons of ground wood was produced in the United States in February, 1928, contrasted with 81,739 tons in January last, and stocks at mills at the end of February amounted to 100,631 tons, against 103,264 tons a month previously, according to statistics compiled by the American Paper and Pulp Association.

Chemical Pulp

The uptrend in chemical pulp market values has been checked by the termination of the strike in the Swedish pulp mills, as would be expected, yet prices are well maintained at the levels reached about a month ago and there appears to be a moderately firm undertone in evidence. Opinion in the pulp trade is, in fact, that a sufficiently large production has been lost as a result of the more than three months' shutdown of mills in Sweden to remove any danger of a surplus of chemical pulp in the market during the remainder of this year, and therefore to sustain prices on at least prevailing levels. Domestic producers express confidence that they will enjoy a ready market outlet for their pulp over the balance of 1928, and are not pressing sales but are adhering quite steadily to the rates quoted.

Domestic bleached sulphite is still on a quotational level of 3.75 to 4 cents per pound f. o. b. pulp mills, this being the basis named by leading manufacturers in the United States, and No. 1 strong unbleached sulphite of news quality is quoted at 2.50 cents to slightly higher, and No. 1 book grade sulphite at 2.75 to 3 cents a pound. Bleached soda pulp continues firm and is quoted at 3.25 cents or close to this figure f. o. b. pulp mills in most cases. No. 1 kraft pulp is on a price range of 2.75 to 3 cents a pound at producing plants.

Production of chemical pulp in the United States in February last amounted to 118,092 net tons, compared with 127,797 tons in the preceding month, according to the American Paper and Pulp Association, while mill stocks at the end of February were 26,664 tons, against 25,562 tons a month previously.

Quotations f. o. b. pulp mills are as follows:

Bleached sulphite	3.75-4.75
Easy bleaching sulphite	2.75-3.00
Unbleached sulphite, No. 1 strong (news grade)	2.50-2.75
Unbleached sulphite, No. 1 book	2.75-3.00
Soda pulp, bleached	3.00-3.25
Mitscherlich, unbleached	3.00-3.25

What does the pop test say about your sheet?

If your paper is weakening, it needs a good tonic. A tonic that is adding strength to so many kinds of paper is Quartz Quality Silicate. The prescription is simple—12 quarts per 1000 lb. beater. But what a whale of a difference. The pop test of many papers is increased as much as 10%. Let us send you a sample of Quartz Quality Silicate and tell you more about how it can help put pep in your sheet.

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Wm. R. Maull, plant manager, in writing about a stack of Butterworth Rolls said, "The rolls have long life."

You too will find that Butterworth Calender Rolls give extra service on coated super and glassine.

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"Worry will whittle off a man's efficiency faster than a boy with a sharp jackknife can sharpen a pine stick."

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We do the worrying and make sure that these papers are as perfect as it is possible to make them before they leave our mill.

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In 38 years of design and manufacture of water filters and softeners, Hungerford & Terry have installed an aggregate daily capacity of more than one billion gallons.

This experience has enabled them to aid paper and other manufacturers to improve their products and reduce their costs of production by the proper treatment of that important material—water.

Is your water supply properly protected to insure highly efficient mill operation and the highest quality in your product? Hungerford & Terry Engineers will investigate your conditions and report to you fully without obligation.

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INC.
CLAYTON, N. J.

New Papers

Writing—	
White rag	15-40
White sulphite	9-30
Colored rag	15-40
Colored sulphite	8-30
Ledger—	
White rag	16-40
White sulphite	9-30
Colored sulphite	8-30
Colored rag	15-40
Bonds—	
White rag	16-40
White sulphite	7-30
Colored sulphite	7-30
Colored rag	15-40
Book—	
No. 1 S. & S. C.	5.75- 8.00
Machine finished	5.50- 8.00
English finished	5.50- 8.00
Coated and enameled	8.00-14.00
Lithograph, M. F.	8.00-15.00
Newsprint—	
Rolls, contract	3.25- ....
Rolls, transient	.....3.50- ....
Sheets	3.65- 3.80
Side runs	3.00- 3.25
Cover stock—	
Coated, both sides	10.25
Coated, one side	10.15
Tissue—	
No. 1 white, 20x30	.75- .90
No. 2 white, 24x36	.70- .80
No. 1 manila, 24x36	.70- .80
Kraft	.90- 1.00
Wrapping—	
No. 1 kraft	5.75- 6.25
No. 2 kraft	4.50- 5.00
Southern kraft	4.25- 4.75
Boards—	New York and Chicago
Solid news	50.00-55.00
Straw	52.50-57.50
Plain chip	42.50-45.00
White coated chip	55.00-60.00
Manila coated chip	55.00-60.00
Binder's board	70.00-75.00

Chemical Pulp

(Continued from page 341)

Kraft, No. 1	2.75-3.00
Screenings, refined	1.40-1.60

Chemicals

Casein quotations appear to have steadied following the slight downtrend a few weeks ago, and domestic casein is quoted at 16 cents to slightly higher per pound, and the imported product at about 17 cents, duty paid. Caustic soda is in a steady price position at 2.90 to 3 cents per pound for spot shipments f. o. b. works, and soda ash continues to be quoted at 1.32½ cents a pound packed in bags at works. The market for paper and pulp-making chemicals is fair, with the chief movement against contracts.

Average quotations are as follows:

Alum, lump ammonia	3.50 - 3.75
Alum, lump starch	3.75 - 4.00
Blanc fixe, powder	4.00 - 4.25
Bleaching powder	2.00 - 2.35
Brimstone (long ton, at mine)	18.00 -20.00
Casein (duty paid)	16.00 -17.00
Caustic soda, spot delivery	2.90 - 3.00
China clay, domestic washed	8.00 -10.00
China clay, foreign	14.00 -20.00
Rosin, Grade E	9.00 - 9.35
Satin white	2.00 - 2.25
Soda ash, 50 per cent light (bags)	1.32½- ....
Starch, papermakers', in bags	3.97 - ....
Talc (ton)	16.00 -18.00

Market Quotations

Issued by H. D. Knox & Co., 44 Broad St., New York

The quotations mentioned below are more or less nominal in some cases owing to the inactivity of the securities, but we invite inquiries on these and other allied industries' securities when we will endeavor to furnish actual markets.

BONDS	Bid	Asked
A. P. W. Pulp & Power Co. 6s, 1948	....	100
Abitibi Fibre Co. 6s, 1947	100¾	100½
Abitibi Power & Paper Co. 6s, 1931	101	101¾
Abitibi Power & Paper Co. 6s, 1940	104¾	....
Advance Bag & Paper Co. 6s, 1943	104½	....
American Sales Book Co. 6s, 1939	99½	....
Advance Bag & Paper Co. 6s, 1952	99½	....
Bastrop Pulp & Paper Co. 6½s, 1940	104¾	....
Brush Moore Paper Co. 6½s, 1937	....	97½
Beaver Products Co. 7½s	110	112
Beaver Board Co. 8s, 1933	101	....
Bedford Pulp & Paper Co. 6½s, 1942	98	100
Belgo-Canadian Paper Co. 6s, 1943	103	104
British Columbia Pulp & Paper Co. 6s, 1950	90	92
Brompton Pulp & Paper Co. 6s, 1935	103	....
Brompton Pulp & Paper Co. 6s, 1946	102	104
Brown Co. 5½s, 1946	102	103
Celotex Co. 6s, 1936	0W	100
Celotex Co. 6½s, 1939	100	101½
Canada Paerboard Co. s, 1937	98½	100
Central Paper Co. 6½s, 1941	86	89
Central Paper Co. 6s, 1933	86	89
Central Paper Co. 7s, 1932	87	92
Champion Fibre Co. 6s, 1941	101½	102¼
Champion Paper Co. 6s, 1945	95	98
Champion Coated Paper Co. 6s	102½	....
Columbia River Paper Mills 6s	98	....
Defiance Paper Co. 6s, 1939	98	100
Dells Paper & Pulp Co. 6s, 1939	95	98
Donnacona Paper Co. 5½s, 1948	98½	99½
Eastern Manufacturing Co. 7s, 1938	98	100
Escanaba Paper Co. 6s, 1939	98	102
Escanaba Paper Co. 5s, 1928	99	101
Filer Fibre Co. s, 1937	93	....
Fort William Paper Co. 6s, 1946	101	102
Fitchburg Paper Co. 5s, 1929	99	....
Glatfelter Paper Co. 6s, 1938	104	106
Hammermill Paper Co. 6s, 1939	101½	....
Hartje Paper Co. 6s	1½	....
Hawley Pulp & Paper Co. 6s, 1946	98	....
Hoberg Paper & Fibre Co. 7s, 1937	94½	96½
Howard Smith Paper Co. 7s, 1941	105	....
Industrial Fibre Co. 8c	100	102
Itasca Paper Co. 6s	97	....
Itasca Paper & Prairie River 5½s	85	90
Jessup & Moore Paper Co. 6s, 1945	85	90
Kalamazoo Vegetable Parchment 6s, 1938	99	101
Manitoba Paper Co. 6½s	103	105
Mead Fibre Co. 7s, 1937	100	....
Munising Paper Co. 6s, 1936	98	....
Marathon Paper Mills 5½s, 1942	99	....
Marinette & Menominee Paper Co. 7½s, 1936	103½	104½
Mead Pulp & Paper Company 5s	94	....
Mengal Company 7s, 1934	103	105
Mengal Company 7s, 1933	101	....
Minnesota & Ontario Paper Co. 6s	99½	101¼
Missisquoi Pulp & Paper Co. 7s, 1929	99½	....
Missisquoi Pulp & Paper Co. 6s, 1945	99	....
Monroe Paper Products 7½s, 1932	97	99
Murray Bay Paper Co. 6½s	103¾	104
Oswego Falls Paper Co. 6s, 1941	99	101
Parker Young Co. 6½s, 1944	99	101
Paper & Textile Machinery Co. 7s	100	103

(Continued on page 349)

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E. B. EDDY COMPANY, LTD., Hull, Canada
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KRAFT HURUM NORWAY SPECIAL — "HURUM SPECIAL" Extra Strong Kraft

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PAPER

EXPORTS

In point of value, exports of paper and paper products from the United States during February, 1928, showed a decline as compared with the preceding month, but an increase over the shipments in February lats year, according to official statistics compiled and issued by the U. S. Department of Commerce. During February, last, total exports of paper of all kinds were valued at $2,387,926, contrasted with $2,422,699 in January this year, and $2,145,060 in February, 1927.

Exports of newsprint paper showed a marked falling off in February as compared with the preceding month, reaching a total of 1,077,990 pounds for a value of $42,237, against 3,515,046 pounds of a value of $153,352 in January last, and also a decline as contrasted with 1,748,081 pounds of a value of $83,110 exported in February last year. Exports of book paper, not coated, amounted to 1,705,487 pounds, of a value of $126,993, in February this year, recording a gain over the shipments of 1,377,969 pounds of a value of $118,733 in the similar month of 1927. Wrapping paper exports last February climbed to 3,402,924 pounds of a value of $269,865, compared with 2,906,123 pounds of a value of $194,781 in the same month a year ago, while writing paper shipments increased from 727,029 pounds of a value of $125,471 in February last year to 1,528,752 pounds of a value of $205,235 in February this year. Exports of box board were valued at $124,227 in February this year, compared with 164,924 a year ago, and of other paper board and straw board $135,025, against $143,296 in February, 1927.

U. S. export of paper towels and napkins in February were valued at $31,680, showing a considerable increase over the shipments of a value of $18,115 in the same month a year ago.

IMPORTS

Wood Pulp

The lockout in the wood pulp mills of Sweden was settled early on the morning of Easter Sunday, April 8, when representatives of the warring mill owners and their employes reached an agreement on wages, and since then something of a different complexion has been put on the chemical pulp market. No longer are prices on the uptrend, the march of market values to higher levels having been brought more or less abruptly to a halt, and yet the tone of pulp values is fairly steady. No longer are predictions being made that record-breaking price levels since the period following the World War will be witnessed, but there is confidence expressed in most parts of the pulp trade that a firm market will obtain over the balance of this year. Nor does there appear to be any danger of a serious shortage of chemical pulp, as seemed probable prior to the ending of the labor conflict in the Scandinavian mills, though there is every reason to presuppose that no surplus of supply will hang over the market during the remainder of 1928.

In other words, the long shutdown of the Swedish pulp mills—lasting three months and a week—resulted in a large enough loss of pulp production to make for a firmer statistical market condition, though not necessarily likely to lead to any very serious difficulties for consumers of wood pulp. The Scandinavian manufacturers apparently have realized their objective—of eliminating enough tonnage of pulp from the market to put prices on a higher level and to assure a firmer price position—but on the other way around, it seems safe to say that paper mills in the United States are not going to be occasioned any great trouble in securing all the pulp required nor are they going to find it necessary to pay unreasonably high prices to cover their needs.

It is estimated conservatively that the loss in production caused by the lockout in the mills in Sweden from January 2 to April 8 is between 350,000 and 375,000 tons of sulphite and kraft pulp, divided about 250,000 tons of sulphite—mostly strong unbleached—and 100,000 tons to slightly more of kraft pulp. With this sizable tonnage taken out of the market, there appears small likelihood of prices receding from present levels, because it is probable the world will need all the pulp that is produced in Scandinavia and elsewhere during the balance of this year. At the same time, candid opinion among consumers and importers in this country is that no sharp advancement in market values will be recorded, most authorities expecting that prices will be fully stabilized and maintained at about ruling levels.

Demand has dropped off considerably since the news was received of the settlement of the strike in the Swedish industry. Paper and board manufacturers in the United States have let down in their buying, having contracted for large first open water shipments from Scandinavia and evidently waiting to see if they will receive these commitments when navigation is opened up over the Baltic. Swedish manufacturers are advising that they expect to deliver every pound of pulp they have sold, although there may be some delay in the early spring shipments. Mills in Sweden are reported to have resumed production on a full scale in the last several weeks, and in all probability will succeed in making up some of the tonnage lost during the period of the lockout.

Currently quoted prices are around 2.75 cents per pound ex dock American Atlantic ports for prime strong unbleached sulphite, 2.90 cents for prime easy bleaching sulphite, and 3.75 cents for prime bleached sulphite. Prime standard Swedish kraft pulp is quoted at 2.70 to 2.80 cents ex dock New York. Imported ground wood is on a price basis of about $31 per short ton ex dock Atlantic seaboard. Sales have been and are being made at these prices, but both sellers and buyers are pursuing a more or less waiting policy, and there is not a great deal of activitiy in the market.

Imports of wood pulp into the United States continued on a fairly high level during February last, although failing to equal the exceptionally heavy receipts in the preceding month. Total imports of chemical pulp in February were 116,632 long tons, valued at $6,645,529, compared with 140,394 tons of a value of $8,076,033 in January last, according to U. S. Department of Commerce figures. Imports of ground wood amounted to 18,885 long tons in February, valued at $488,850, showing little change from the 18,823 tons of a value of $445,651 imported in the preceding month.

Current market quotations ex dock New York, and receipts at the port of New York during April, follow:

Bleached sulphite, No. 1	3.75	4.00
Unbleached sulphite, strong No. 1	2.70	2.85
Unbleached sulphite, No. 2	2.50	2.60
Easy bleaching sulphite	2.85	3.00
Mitscherlich unbleached, genuine	3.00	3.25
Mitscherlich unbleached, ordinary	2.60	2.75
Kraft, standard Swedish	2.70	2.80
Ground wood, per ton (dry)	31.00	32.00

Castle & Overton, 1,216 bls. from Rotterdam and 2,882 Hamburg; J. Andersen & Co., 480 bls. from Sarpsborg and 500 Trieste; Atterbury Bros., 1,098 bls. from Oslo; M. Gottesman & Co., 330 bls. from Rotterdam and 6,000 Sebenico; A. P. W. Paper Co., 15,228 bls. from Sheet Harbor; Perkins-Goodwin Co., 375 bls. from Oslo; Chase National Bank, 2,000 bls. from Greaker; E. J. Keller Co., 1,000 bls. from Hamburg; Parsons & Whittemore, 108 bls. from

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Unbleached Sulphite 50 tons daily
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MITTS & MERRILL SHEET STOCK **SHREDDER**

Giving the Beater a Lift

The operation of a beater, with its wear and tear and tremendous power consumption, has one primary purpose, namely, hydration. Any thing that will economically bring about hydration more quickly relieves the beater just that much, cuts down on operating costs and speeds the process of paper making.

The MITTS & MERRILL SHEET & LAP STOCK SHREDDER performs on magazines, books, old paper and boxboard, frozen or dried pulp laps in such a way as to greatly reduce their resistance to hydration when they reach the beater. It gives the beater an economical lift.

Our Shredders are built in sizes with spouts ranging from 18" to 45" wide. We will be glad to quote you on any size adapted to your requirements.

We also build a 100% efficient "Hog" t o reduce pulp mill bark and wood refuse

See pages 378 and 379 in the Paper and Pulp Mill Catalogue

MITTS & MERRILL 1013 Tilden St. **SAGINAW, MICH.**

Gothenburg; Chemical National Bank, 128 bls. from Hamburg; Bulkley, Dunton Co., 125 bls. from Hamburg; Order, 930 bls. from Helsingfors, 18,725 Hango, 3,600 Greaker, 2,655 Stockholm, and 985 Hamburg.

Paper Stock

Imports of papermaking rags into the United States appear to be falling off steadily. Official Government statistics for the month of February last show that a total of 31,850,747 pounds of rags was imported, valued at $631,339, showing a decline from the 37,631,368 pounds of a value of $681,540 imported in the preceding month. Imports of waste bagging and waste paper in February amounted to 8,934,491 pounds, while imports of old rope and miscellaneous paper stock were 3,138,915 pounds in the same month.

Receipts of rags and other papermaking stock through the port of New York in April were light; in fact, unofficial figures indicate they were smaller than have been received in any single month in a long time. Imports of all kinds of paper stock other than wood pulp at New York in April, 1928, these data being taken from manifests of steamers reaching that port, during the month follow:

Old Rope—Brown Bros. & Co., 100 bls. and 270 coils; William Steck & Co., 77 bls.; S. Birkenstein & Sons, 50 bls.; Ellerman's Wilson Line, 137 coils; George W. Millar & Co., 74 coils; Alfred Bloch & Co., 82 coils; American Exchange Irving Trust Co., 73 coils; E. J. Keller Co., 149 bls.; Order, 115 bls. and 100 rolls.

Old Bagging—Darmstadt, Scott & Courtney, 139 bls.; Anchor Line, 35 bls.; Overton & Co., 597 bls.; Banca Commerciale Italiana, 128 bls.; Bank of the Manhattan Co., 48 bls.; E. J. Keller Co., 73 bls.; Order, 148 bls.

Rags—E. J. Keller Co., 1,078 bls.; J. Reiss & Co., 5 bls.; E. E. Weiss, 6 bls.; S. Firth, 30 bls.; Paul Berlowitz, 59 bls.; Castle & Overton, 202 bls.; Katzenstein & Keene, 103 bls.; C. J. Osborn, 4 bls.; W. Lowenthal & Co., 36 bls.; J .Cohen & Sons, 49 bls.; Jaffe Products Co., 45 bls.; The Barrett Co., 61 bls.; Chase National Bank, 271 bls.; Equitable Trust Co., 54 bls.; Bankers Trust Co., 38 bls., National City Bank, 284 bls.; Central Mercantile Bank & Trust Co., 46 bls.; Bank of New York & Trust Co., 275 bls.; Corn Exchange Bank, 4 bls.; New York Trust Co., 32 bls.; National Bank of Commerce, 46 bls.; American Overocean Co., 33 bls.; Goldman, Sachs & Co., 84 bls.; D. C. Andrews & Co., 7 bls.; Milton Snedeker Corp., 90 bls.; A. W. Fenton, Inc., 712 bls.; A. C. Fetterolf, 56 bls.; Brown Bros. & Co., 40 bls.; Advance Import Co., 8 bls.; Gallagher & Ascher, 55 bls.; J. B. Moors & Co., 101 bls.; Order, 335 bls.

Miscellaneous Paper Stock—Philadelphia Girard National Bank, 88 bls.; Brown Bros. & Co., 530 bls.; Overton & Co., 319 bls.; Darmstadt, Scott & Courtney, 83 bls.; Amsinck, Sonne & Co., 9 bls.; P. Garvan, Inc., 114 bls.; Ellerman's Wilson Line, 119 bls.; Alexander H. Searle, Inc., 470 bls.; Daniel I. Murphy, Inc., 75 bls.; American Exchange Irving Trust Co., 192 bls.; Salomon Bros. & Co., 199 bls.; State Bank, 50 bls.; C. W. Frank, 69 bls.; Bank of the Manhattan Co., 763 bls.; Equitable Trust Co., 101 bls.; Union Bank & Trust Co., 132 bls.; Castle & Overton, 1,007 bls.; Daniel M. Hicks, Inc., 110 bls.; North American Rag Trading Co., 273 bls.; Van Oppen & Co., 59 bls.; A. W. Fenton, Inc., 283 bls.; Garfield National Bank, 29 bls.; A. C. Fetterolf, 69 bls.; J. Cohen & Sons, 93 bls.; Manufacturers Trust Co., 23 bls.; B. D. Kaplan & Co., 113 bls.; S. Birkenstein & Sons, 474 bls.; Chase National Bank, 614 bls.; George W. Millar & Co., 250 bls.; E. Fernesse, 212 bls.; Alfred Bloch & Co., 109 bls.; Banca Commerciale Italiana, 612 bls.; Bank of New York & Trust Co., 86 bls.; F. Hickey & Sons, 67 bls.; Victor Galaup, Inc., 1,281 bls.; T. D. Downing & Co., 62 bls.; E. Butterworth & Co., 138 bls.; C. R. Spence & Co., 405 bls.; Ralli Bros., 18 bls.; Schleich & Woll, 17 bls.; E. J. Keller Co., 1,348 bls.; William Steck & Co., 279 bls.; E. Mayer, 26 bls.; R. Canoval & Sons, 39 bls.; Gallagher & Ascher, 125 bls.; New York Trust Co., 70 bls.; Order, 2,586 bls.

Paper

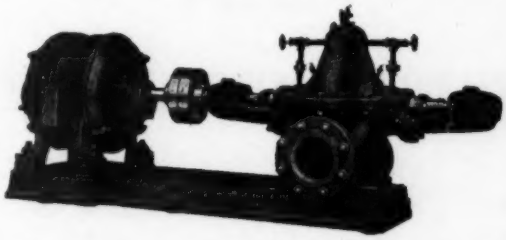
In point of value, importations of paper into the United States during February, 1928, showed a decline from receipts in the preceding month. Department of Commerce statistics put the total imports of paper of all kinds into this country in February at a value of $12,740,217, contrasted with imports of a value of $13,017,337 in January this year, and $10,110,993 in February last year.

Paper imports in April were on a fair scale, judging from arrivals at the port of New York. Usual supplies of print paper, wrapping, cigarette, filter, hanging and other grades were received, and receipts of strawboard were moderately heavy. Imports of all kinds of paper at the port of New York in April, 1928, these data being taken from manifests of steamers reaching that port during the month, follow:

Printing—Journal of Commerce, 97 reels from Helsingfors and 144 reels Hango; E. Dietzgen & Co., 131 cs. from Rotterdam and 17 cs. Hamburg; P. C. Zuhlke, 26 cs. from Rotterdam and 128 cs. Antwerp; Dingelstedt Co., 27 cs. from Rotterdam; P. Puttmann, 5 cs. from Havre; Burroughs, Welcome & Co., 15 pkgs. from London; H. Reeve Angel & Co., 350 reels from Hango; Perkins-Goodwin Co., 527 reels and 296 bls. from Hamburg; F. Henjes, Jr., 68 reels from Hamburg; Keuffel & Esser Co., 21 rolls from Hamburg; A. Price & Son, 43 cs. from Rotterdam; W. Bersch, 25 cs. from Rotterdam; B. F. Drakenfeld & Co., 48 cs. from Liverpool; J. J. Bernitz, 56 bls. and 47 reels from Hamburg; C. Steiner, 41 cs. from Rotterdam; M. J. Bechtold & Co., 15 cs. from Bremen; Columbia Steamship Co., 42 bls. from Bremen; Lincoln Paper Co., 24 cs. from

LAWRENCE CENTRIFUGAL "Vortex" PUMPS

Excellent in design, developed by pump specialists, and built of best materials in a factory which builds Centrifugal Pumps exclusively. They must be good. More than 150 pumps sold to a single mill.



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We have been handling "STEPHENSON" for the last ten years, and our sales have steadily increased. In all that time we have never had cause for complaint, either as to packing, shipping, checking or the quality of the goods.

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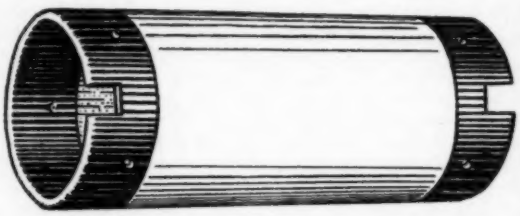

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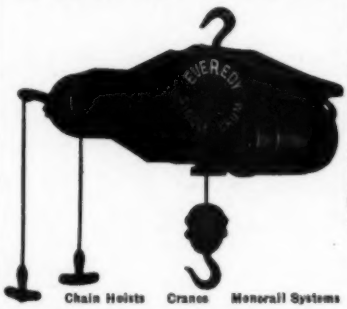

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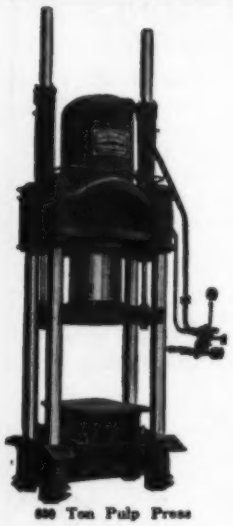
Hydraulic Equipment for Pulp and Paper Mills, Wall Board Plants, Etc.



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HYDRAULIC PUMPS
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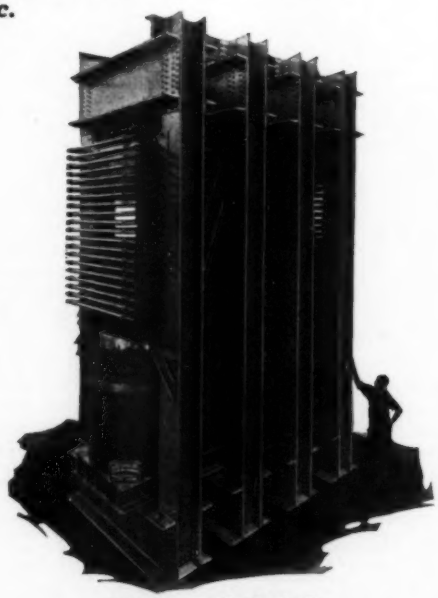
VALVES, FITTINGS, ETC.

Southwark Hydraulic Equipment is the choice of the largest and best known Pulp and Paper Mills throughout the country. They find Southwark products give the most efficient service under exacting conditions. Write for Bulletin No. 14.



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PHILADELPHIA, PA.

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AKRON
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Bremen; Walker Goulard Plehn Co., 101 cs. and 108 reels from Bremen and 17 bls. Rotterdam; Watchtower Bible and Tract Society, 78 reels from Hango; Order, 1,123 reels from Bremen and 455 reels from Hamburg.

Wrapping—C. Steiner, 34 bls. from Rotterdam and 19 cs. Hamburg; Wilkinson Bros. & Co., 14 bls. from Hamburg; National Consumers Paper Corp., 5 bls. from Rotterdam; Republic Bag & Paper Co., 3 cs. from Rotterdam; F. C. Strype, 35 pkgs. from Antwerp; International Forwarding Co., 25 cs. from Hamburg; Bendix Paper Co., 5 cs. from Hamburg; Steffens, Jones & Co., 9 cs. from Antwerp; Standard Products Corp., 23 cs. from Antwerp; Birn & Wachenheim, 45 cs. from Antwerp; E. Dietzgen & Co., 7 cs. from Hamburg; Order, 104 cs. from Antwerp and 20 bls. Rotterdam.

Cigarette—British-American Tobacco Co., 90 cs. from Havre; P. J. Schweitzer, Inc., 171 cs. from Marseilles; Surbrug Co., 20 cs. from Havre; Southern Pacific Co., 3 cs. from Havre; Standard Products Corp., 358 cs. from Havre; American Tobacco Co., 1,200 cs. from Bordeaux; De Manduit Paper Corp., 683 cs. from St. Nazaire and 348 cs. from Havre; Order, 108 cs. from Hamburg.

Writing—Guibont Freres & Co., 18 cs. from Havre; Gallagher & Ascher, 4 cs. from London; F. L. Kraemer & Co., 3 cs. from Southampton; A. Murphy & Co., 2 cs. from Bremen.

Filter—H. Reeve Angel & co., 52 cs. from Southampton and 32 cs. London; E. Fougera & Co., 78 cs. from Bordeaux; Brunovan Co., 5 cs. from Bordeaux; J. Manheimer, 165 bls. from Southampton; C. Sleicher & Scholl Co., 15 cs. from Hamburg; A. Giese & Son, 20 bls. from Southampton; Order, 3 cs. from Bordeaux.

Drawing—Keuffel & Esser Co., 5 cs. from Southampton, 74 cs. and 135 rolls Hamburg, and 16 cs. Rotterdam; H. Reeve Angel & Co., 6 cs. from London.

Tissue—F. B. Vandegrift & Co., 29 cs. from Liverpool; B. F. Drakenfeld & Co., 41 cs. from Liverpool; Schenkers, Inc., 26 cs. from Hamburg; W. J. Byrnes & Co., 9 cs. from Liverpool; F. C. Strype, 4 cs. from Hango; Order, 13 cs. from Hamburg.

Hanging—A. C. Dodman, Jr., Inc., 33 bls. from Liverpool and 11 pkgs. Southampton; C. A. Haynes & Co., 9 bls. from Liverpool and 134 ukgs. London; W. H. S. Lloyd & Co., 20 pkgs. from Liverpool and 8 bls. London; F. J. Emmerich & Co., 32 bls. from Liverpool, 24 bls. London, 53 cs. Hamburg and 3 bls. Southampton; Sanderson & Son, 37 bls. from London; R. F. Downing & Co. 10 pkgs. from London; W. P. Nelson, 2 cs. from Hamburg; F. A. Binder, 34 bls. from Bremen; International Mercantile Marine Co., 10 cs. from Southampton; J. E. Bernard & Co., 9 bls. from Antwerp and 6 cs. Southampton; E. O'Brien, Inc., 4 pkgs. from London; Order, 7 bls. from Liverpool.

Photo—J. J. Gavin & Co., 6 cs. from Liverpool and 7 cs. Southampton; Globe Shipping Co., 290 cs. from Bremen; Gevaert Co. of America, 134 cs. from Antwerp and 108 cs. Rotterdam; P. C. Zuhlke, 103 cs. from Antwerp; J. H. Schroeder Banking Corp., 175 cs. from Bremen; P. Puttmann, 28 cs. from Antwerp; Medo Photo Supply Co., 5 cs. from Southampton.

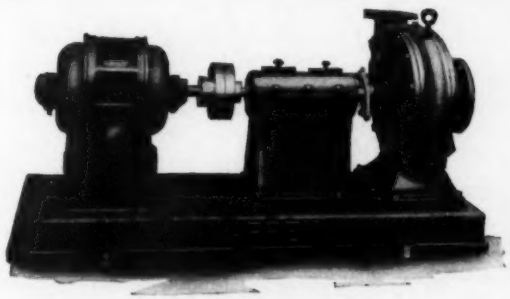
Board—Robert Wilson Paper Corp., 94 reels from Rotterdam; Adrian Vuyck, 2,515 reels from Rotterdam; Perkins-Goodwin Co., 436 rolls from Rotterdam; J. P. Heffernan Paper Co., 315 pkgs. from Rotterdam; Coty, Inc., 38 cs. from Havre; F. B. Vandegrift & Co., 6 cs. from London; State Bank, 111 reels from Rotterdam; Lagerloef Trading Co., 266 reels from Hango and 249 bls. Bremen; Haas Bros., 192 reels from Rotterdam; American Express Co., 271 cs. from Hamburg; Favor, Ruhl & Co., 4 cs. from London; Order, 87 rolls from Rotterdam.

Miscellaneous—S. Gilbert, 10 cs. from Rotterdam and 33 cs. Bremen; Coenca-Morrison Co., 7 cs. from Havre; Keller-Dorain Paper Co., 47 cs. from Havre; Hensel, Bruckman & Lorbacher, 24 cs. from Havre, 33 cs. Bremen and 10 cs. Southampton; J. Montgolfer, 105 cs. from Havre; Whiting-Patterson Co., 70 cs. from Southampton and 24 cs. London; Japan Paper Co., 46 cs. from Genoa, 37 cs. Rotterdam and 3 cs. Havre; H. Reeve Angel & Co., 2 bls. from Southampton and 10 cs. London; C. A. Johnson, 18 bls. from Liverpool; Steiner Paper Corp., 52 cs. from Rotterdam; J. Beckhardt & Co., 13 cs. from Rotterdam; Judson Freight Forwarding Co., 45 cs. from Rotterdam; Tamm & Co., 8 cs. from Rotterdam; P. H. Petry & Co., 12 cs. from Rotterdam and 2 cs. Bremen; Richardson Bros., 4 cs. from Liverpool; F. Murray Hill, Inc., 6 cs. from Bremen; Miller & Wright Paper Co., 2 cs. from Rotterdam; Titan Shipping Co., 15 cs. from Havre; A. C. Rempert, 12 cs. from Antwerp; Brown Bros. & Co., 7 cs. from Hamburg; W. J. Byrnes & Co., 10 cs. from Hamburg; Sinclair & Valentine, 4 cs. from Hamburg; Gallagher & Ascher, 2 cs. from London; Wilkinson Bros. & Co., 118 bls. from Rotterdam; Arnhold & Co., 25 cs. from Canton; D. C. Andrews & Co., 6 cs. from Havre; Fuchs & Lang Mfg. Co., 30 cs. from Hong Kong; Globe Shipping Co., 2 cs. from Rotterdam and 44 cs. Hamburg; R. F. Downing & Co., 17 cs. from Havre; Borden & Riley Paper Co., 15 cs. from Antwerp; H. C. Neblung, 3 cs. from Antwerp; E. M. Sergeant Co., 4 cs. from Gothenburg; American Exchange Irving Trust Co., 30 cs. from Hamburg; Central Union Trust Co., 18 cs. from Hamburg; Schmidt, Pritchard & Co., 4 cs. from Hamburg; B. Meiners, 15 cs. from Canton; B. C. Ritchie & Co., 5 cs. from Canton; Martin & Bechtold, 60 cs. from Canton; Whitfield Paper Works, 40 cs. from Kobe; International Forwarding Co., 15 rolls and 75 cs. from Rotterdam, 4 cs. Hamburg and 5 cs. Antwerp.

Market Quotations

(*Continued from page 343*)

BONDS	Bid	Asked
Paterson Parchment Paper Co. 6s, 1938	101	103½
Peerless Paper Co. 6s	98	100
Penobscot Chemical & Fibre Co. 6s, 1942	102½	104
Price Bros. 6s, 1943	105	108
Queen City Paper Co. 7s, 1933	97	99
Riordan Pulp & Paper Co. 6s, 1942	102	
River Raisin Paper Co. 6s, 1936	98	101
Roland Paper Co. 6s, 1937	99	101
St. Regis Paper Co. 6½s	99	101
St. Regis Paper Co. 6s, 1931	101	101½
St. Anne Paper Co. 6½s, 1946	103	104½
St. Croix Paper Co. 5s, 1928	99	
St. Helens Pulp & Paper Co. 6½s, 1941	99	



It Stands the Gaff

YOU can put a Warren Stuff Pump to work anywhere. It will look after itself with the least fussing and attention.

The Warren Stuff Pump was designed by men who know pulp and paper mill requirements and built by an organization that has specialized on fine pumps for thirty years.

It handles pulped stocks having a consistency of 5% and over with exceptional efficiency. And it does its job twenty-four hours a day, day in and day out, year after year.

In a word, it's the stuff pump for *your* mill.

Ask for Bulletins describing and illustrating Warren Stuff Pumps or other Centrifugal or Reciprocating Pumps for every pulp and paper mill service.

Warren

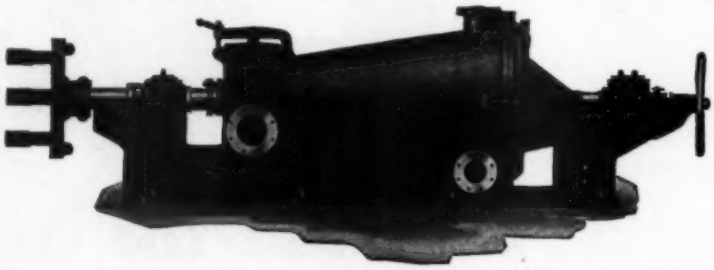
Steam Pump Company, Inc.

Warren, Mass.

Atlanta Boston Charlotte Cleveland Dallas Kansas City New Orleans New York Oklahoma City Philadelphia Pittsburgh San Francisco Scranton Seattle St. Louis St. Paul Toronto

1022

No. 3 Hercules JORDAN Built to Render Long and Continuous Service



Timken
Roller Bearings

Less power, longer life and greater efficiency. Bearings do not have to be dissembled from the shaft.

An Achievement of Engineering Skill

The #3 Hercules Jordan presents the latest engineering ideas in Jordan practice. Patented efficiency features are so numerous as to place this machine in a class by itself.

Generously oversized, it delivers more pulp with less power. Instant—accessible for cleaning and inspection. Adaptable for one piece or sectional fillings, for both plug and shell.

Wire or write for detail specifications,—Our engineering department is at your service.

THE HERMANN MANUFACTURING CO.

LANCASTER Catalogue on Request. OHIO

BOLTON QUALITY

JOHN W. BOLTON & SONS, INC.

EAGLE KNIFE & BAR WORKS

LAWRENCE, MASS.

The only firm making KNIVES for every machine from wood pile to finishing room.

It's the KNIVES that do the work!

STANDARD-FLANGED-WOOD PIPE

Patent Applied for

Manufactured by

MICHIGAN PIPE COMPANY

Office and Factory: Bay City, Michigan

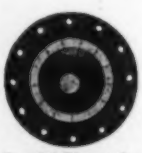
PRODUCTS:

Pipe for conveying—Pure Water, Acid Water, White Water, Sulphite Waste Water, Paper Stock, Ground Wood Pulp, Gases

SPECIAL FITTING FOR ACID WORK WRITE FOR CATALOG

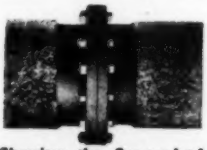
Michigan Pipe for Paper Mills

Liquid Conveyed Touches No Metal



Special Flange for Paper Mills.

ADVANTAGES:
Saves Power
No Discoloration
Lasting Qualities
Light in Weight
Cheaper.



Showing the Special Flange Joint. Light in Weight, Specially Desired for Inside Installations. Easy to Take Apart

SERVICE:
We maintain experts who will take entire charge of pipe installations if desired.

OVER 100 PAPER MILLS ARE NOW USING STANDARD FLANGED WOOD PIPE INSIDE THEIR MILLS

St. Lawrence Paper Mills 6s, 1931	102¼	104
St. Lawrence Pulp & Lumber Co. 6s, 1933	8½	10
Spruce Falls Power & Paper Co. 5½s		100
Spanish River Pulp & Paper Co. 6s, 1931	108	
Stevens & Thompson Paper Co. 6s, 1942	93	94
Southern Advance Bag & Paper Co. 6s, 1947	97	
Taggart Bros. 6s, 1944	95	100
Tait Paper & Color Industries 6s	90	96
Ticonderoga Pulp & Paper Co. 6s, 1940	100	102
Tonawanda Paper Co. 5½s	99	101
United Wall Paper Co. 6s, 1947	96	98
Wayagamack Pulp & Paper Co. 6s, 1951	0W	
Watab Paper Co. 6½s, 1942	102	104
Whitaker Paper Co. 7s, 1938	108½	109½
Waterway Paper Products 6s, 1931	99	101
Westfield River Paper Co. 7s	89	93
Warren (S. D.) 6s, 1945	103¾	104¾
Wm. Whitmer Sons-Parsons Pulp & Lumber Co. 8s	15	20
Waterway Paper Products 6s, 1931	101	

STOCKS

American Book Co. Common	145	155
American Sales Book Co. Preferred	106	109
American Sales Book Co. Common	77	79
Androscoggin Pulp Co. Common	30	40
Androscoggin Pulp Co. Preferred	90	
Belgo Canadian Paper Co. Pfd.	106	110
British Columbia Pulp & Paper Co. Common	6	10
British Columbia Pulp & Paper Co. Pfd.	67	
Brompton Pulp & Paper Co. Common	60	
Canada Paperboard Co. Pfd.		94
Champion Fibre Co. Preferred	107½	
Champion Coated Paper Co. Common		125
Champion Coated Paper Co. Preferred	105	107
Chemical Paper Mfg. Co. 1st Pfd.	90	
Chillicothe Paper Co. Pfd.		105
De Jonge (Louis) Co. Pfd.	95	97
Dryden Paper Co. Preferred	42	44
Diem & Wing Preferred	92	97
Downington Paper Co. Pfd.	101	
Donnacona Paper Co. Preferred	103	
Donnacona Paper Co. Common	93	
Eastern Manufacturing Co. 1st Pfd.	54	
Eddy Paper Co. Common	30	
Escanaba Paper Co. Preferred	40	
Escanaba Paper Co. Common	4	
Folding Box Units	30	
Fidalgo Pulp Mfg. Co. Common	75	
Glatfelter Paper Co. Pfd.	103	107
Great Northern Paper Company	91	93
Gair (Robt.) Co.	15	18
Hawley Paper Co. Pfd.	96	
Hammermill Paper Mills Pfd.	109	
Holyoke Card & Paper Co. Pfd.	170	
Hinde & Dausch Co. Pfd.	103	
Hinde & Dausch Co. Common	180	
Indiana Flooring Co. Common		7
International Pulp Co. Pfd.	72	
International Textbook Co.	33	36
Jessup & Moore Paper Co. 1st Pfd.	35	40
Jessup & Moore Paper Co. Common	5	10
Keyes Fibre Co. Common	44	46
Marathon Paper Mills Common	125	
Minnesota & Ontario Paper Co. Pfd.	74	78
Missisquoi Pulp & Paper Co. Pfd.	93	98
Munising Paper Co. Preferred	82	90
Munising Paper Co. Common	24½	30
Morris Paper Co. Units	150	
Northern Paper Mills Co.	30	
National Paper & Type Co. Pfd.	77	83
Oglesby Paper Co. Pfd.	101½	
Occident Paper Co. Pfd.		15
Oxford Paper Co. Preferred	110	
Oxford Paper Co. Common	175	185
Parker Young Co. Preferred	85	90
Parker Young Co. Common	20	
Port Alfred Pulp & Paper Co. Common	135	
Penobscot Chemical Fibre Co. Common	80	30
Price Bros. Common	90	
Package Paper & Supply Units	22	
Robertson Paper Co. Pfd.	5	
Roberison Paper Co. Common	50	
Rogers Paper Company	45	50
Southern Paper Co. 2nd Pfd.	0W	
Sorg (Paul) Paper Co. Pfd.	100	
Sorg (Paul) Paper Co. Common		BW
St. Regis Paper Co. Pfd.	107	108
St. Croix Paper Co. Common	160	170
United States Envelope Co. Common	267	275
United Wall Paper Co. Pfd.	90	95
West Virginia Pulp & Paper Co. Common	57	60
West Virginia Pulp & Paper Co. Preferred	105	106½
West Virginia Timber Co. Pfd.	90	96
Watervliet Paper Co.	10	20
Watson (H. F.) Paper Co.	125	
Wayagamack Paper Co.	104	108

There can be only one Answer

(And you know what it is)

"THE acceptance of Dayton High Speed equipment in more than 70 mills leaves no room for doubt regarding the kind of a beating job Daytons do.

Its up to us to find out right now what Daytons can do for us."

The Dayton Beater & Hoist Co.,
Dayton, Ohio

E. K. Mansfield Co.,
501 5th Ave., New York, N. Y.

DAYTON
HIGH SPEED BEATERS

The survival of the fittest

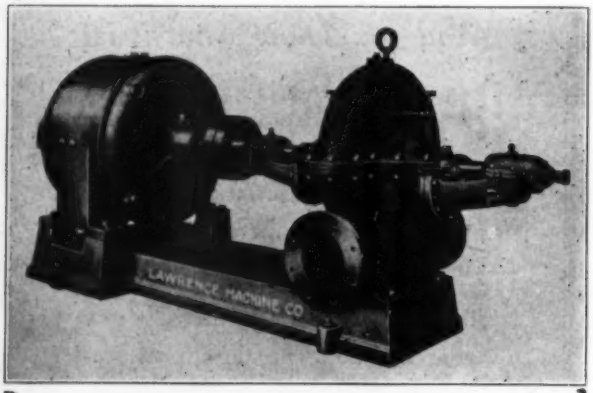
The easiest way to survive competition is to reduce the cost of production.

Our equipment will help you to do this:

Jenssen Acid Towers
Jenssen Spray Coolers
Bullard Gas Washer
Decker Cooking Process
Kamyr Feltless Wet Machine

G. D. Jenssen Co.

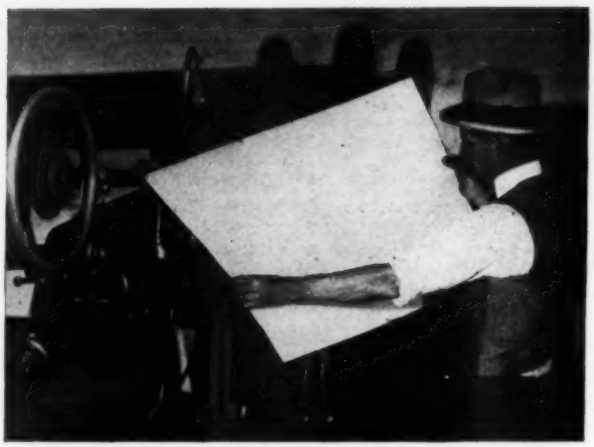
200 Fifth Ave., New York City



LAWRENCE Centrifugal turbine pump, single stage, horizontally split casing, double suction enclosed impeller, high pressure pumps for water supply service, designed and built in all sizes to meet all conditions. Direct connected to electric motors, steam turbines, gasoline engines, etc. Material and workmanship of the highest class. Please submit to our engineering department your specifications. Prompt service rendered at all times.

LAWRENCE MACHINE & PUMP CO.
LAWRENCE, MASS.

Manufacturer of "Lawrence" Pump, Centrifugal Pumping Machinery, Vertical Steam Engines, Contractors for Special Machinery



THE DIE IS CAST!

ONCE a sheet of paper is formed on the Fourdrinier Wire, the die is cast. Later processes may modify the thickness, etc., but inherent defects cannot be removed.

Therefore, the paper maker must guard the formation of the paper on the Fourdrinier machine and see to it that every part of the machine—especially the wire—is in first-class running order.

Tyler Fourdrinier Wires can be depended upon to produce a high quality, uniform sheet—free from any defects due to the wire.

The men who make Tyler Fourdrinier Wires pride themselves in producing a wire that will run straight and true, that will give long service without developing wrinkles or cracks.

Supplied in all widths up to and including 234 inches

The **W. S. TYLER COMPANY,**
Cleveland, O.

TYLER WIRES

Backing Wire — Tyler Fourdrinier Wire — Corduroy Cloth

Foreign Trade Opportunities

The following foreign trade opportunities are issued by the Bureau of Foreign and Domestic Commerce of the United States Department of Commerce. Those interested are requested to communicate with the Bureau at its offices in Washington or New York or its branch offices in other cities, in every case mentioning the number of the inquiries referred to.

No. 30354—Paper and stationery. Cairo, Egypt. Purchase desired.

No. 30375—Wood-pulping machinery. Sydney, Australia. Purchase desired.

No. 30423—Machinery for making paper from wheat straw, and paper for making bags. Aguascalientes, Mexico. Purchase desired.

No. 30468—Tracing paper. Montevideo, Uruguay. Purchase desired.

No. 30422—Wrapping and writing paper. Havana, Cuba. Agency desired.

No. 30416—Rosin. Warsaw, Poland. Purchase desired.

No. 30418—Sulphur. Brussels, Belgium. Agency desired.

No. 30471—Sulphur. Zurich, Switzerland. Purchase and agency desired.

No. 30567—Bond and blotting paper. Bombay, India. Purchase and agency desired.

No. 30568—Newsprint paper, unglazed. Paris, France. Agency desired.

No. 30569—Paper of all kinds. Bombay, India. Agency desired.

No. 30532—Toilet paper, cheap quality. Alexandria, Egypt. Sole agency desired.

No. 30531—Vulcanized fiber for the manufacture of trunks, suitcases, etc. Warsaw, Poland. Agency desired.

No. 30566—Wall board and hard vulcanized fiber. Sao Paulo, Brazil. Agency desired.

No. 30639—Bond writing paper. Temuco, Chile. Purchase desired.

No. 30764—Bond and banknote papers. Shanghai, China. Agency desired.

No. 30766—Old newspapers. Baghdad, Iraq. Purchase desired.

STATEMENT OF OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912,

Of The Paper Industry, published monthly at Chicago, Illinois, for April 1, 1928.

State of Illinois, County of Cook, ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared Edward B. Fritz, who, having been duly sworn according to law, deposes and says that he is the publisher of the Paper Industry and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, Edward B. Fritz, 356 Monadnock Bldg., Chicago, Ill.; Editor, A. Scott Dowd, 356 Monadnock Bldg., Chicago, Ill.; Managing Editor, A. Scott Dowd, 356 Monadnock Bldg., Chicago, Ill.; Business Managers, Edward B. Fritz, 356 Monadnock Bldg., Chicago, Ill.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) Edward B. Fritz, 356 Monadnock Bldg., Chicago, Illinois.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is..... (This information is required from daily publications only.)

EDWARD B. FRITZ,
(Signature of publisher, business manager, or owner.)

Sworn to and subscribed before me this 21st day of March, 1928.
[SEAL] W. B. LATHROP, Notary Public.
(My commission expires July 11, 1930.)

Prime Favorites
For Low Pressure Lines

LUNKENHEIMER
"CLIP" GATE VALVES

are favorites of long standing among valve users everywhere, for the control of steam, water, oil, etc., at pressures up to 100 pounds.

The steel clip surrounding the body rigidly secures the bonnet, lends strength to the body, and facilitates quick disassembling for inspection and cleaning.

Disc is double seated and is sharply tapered, making the valve particularly adaptable for handling heavily impregnated fluids.

The valve is very compact with unusually short face to face dimensions, permitting installation in places where space is limited.

Also procurable with lever for Quick Operating Purposes, and in the All-Iron Pattern for handling solutions which attack bronze but not iron.

Lunkenheimer Distributors, located in all industrial centers, carry complete stocks and will fill your requirements promptly.

Lunkenheimer "Clip" Gate Valves are illustrated and described in Booklet F. 505. A copy will be sent upon request.

THE LUNKENHEIMER CO.
"QUALITY"
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LONDON
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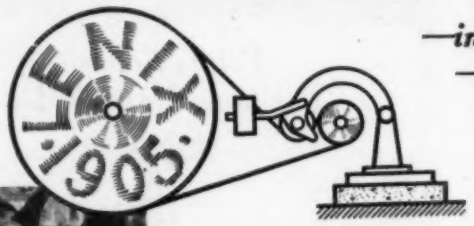
"We Believe that the LENIX Drives



—increase the horsepower considerably
—prolong the life of the belting, and
—make for much smoother drive."

(from a recent letter from the general superintendent of a large paper mill in Manitoba.)

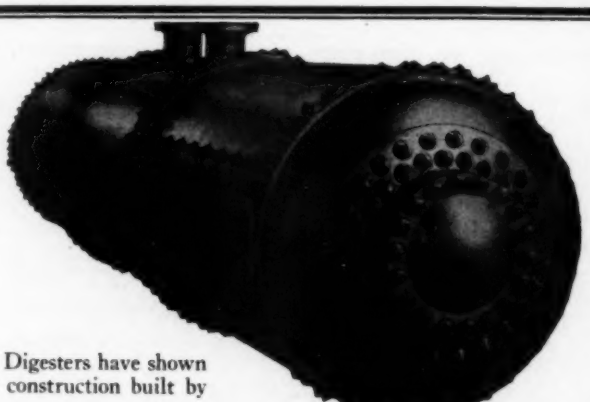
One Point Regarding The LENIX Drive in Connection With New Machinery.
As the LENIX Drive operates on very short centers, considerable floor space can be saved if the machinery as installed is equipped with the LENIX.

IN this large paper mill in Manitoba, each of two broke beaters is equipped with a 50 h.p. LENIX Drive and eight Nash vacuum pumps have as many 100 h.p. LENIXes.
The reason why LENIX Drives increase horsepower, prolong belt life and provide a much smoother drive is because the LENIX avoids belt slippage, maintains correct belt tension and automatically compensates for varying loads.
These distinct advantages together with a number of others go with every LENIX installation. And the LENIX is a logical application for practically any belt drive.
For your own plant, consider making use of the proven advantages of the LENIX Short Center Belt Drive. Send in sketches of your drives together with the operating data and let our engineers recommend the proper unit LENIX.

F. L. SMIDTH & CO.
Incorporated 1895
Engineers
54 Church St., New York, N. Y.

The LENIX *Drive*
(Trademark Reg.)

For Tanks, Too, Biggs is the Same Dependable Source of Supply



Years of satisfactory experience with Biggs Rotaries and Digesters have shown mill men the accuracy and dependability of steel plate construction built by Biggs.
You'll find us exceptionally well qualified also to fabricate and erect stacks, breechings, penstocks and other heavy steel plate work for severe operating conditions.
The Biggs Extra Heavy High Pressure Tank illustated above, for example, is built of shell plate 1¼ in. thick with rivets 1½ in. in diameter and quadruple riveted, double butt strap seams.

THE BIGGS BOILER WORKS COMPANY
General Offices and Works: Akron, Ohio
Eastern Sales Offices: 300 Madison Ave., New York City
Western Sales Offices: 35 South Dearborn St., Chicago, Ill.

The Biggs Boiler Works Co. Akron Ohio
Trade Mark Registered

TANKS AND GENERAL STEEL PLATE WORK